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The Manager

IN any walk of life there are few people so much envied by the smaller fry as "The Manager." He appears to live in Olympian Heights whence he descends perhaps only at rare intervals to tell the lower orders of the industrial machine how to do their job, or what to do. The technique of management appears to those who have not been in positions of responsibility to be absurdly simple, and there must be few who are not fully convinced that they could do the manager's job "standing on their heads" if only given the chance. The Institution of Chemical Engineers, as recorded in our issue of April 22, devoted an evening to the subject of training for administration and, curiously enough, only two evenings later, the British Chemical Plant Manufacturers' Association devoted its annual dinner discussion to the same subject.

It is evident that those who are best in a position to know realise that the manager's job is one of the utmost difficulty for which adequate preparation is needed. The truth is, of course, that such people as the managing director and the general manager live industrially in a different world from the rest of the staff. They must demand that each member of the firm shall do his best to give that specialised advice and assistance for which he is particularly equipped, but when all possible aid has been given in this way, it is the management which must take decisions. It is upon those decisions that the welfare of the firm and the future of the employees will depend. It is a curious commentary upon the British character that although we as a nation are renowned for the excellence of our administrative work, there is no recognised method of training for administration in industry, and the greater number of managers are chosen on the basis of their experience, presence and personal qualities, unbacked by any expert knowledge of economics, of psychology, of market research, or of any of those modern studies that would appear to be particularly the province of the manager.

It is evident from the discussions at the Institution's April meeting and the B.C.P.M.A. dinner that there are two schools of thought upon training for management. There is the view, heard in the greatest volume at the B.C.P.M.A. dinner, that managers are made by their inherent qualities and that to only a few is given the requisite personality. Those few can be

trained by the process described by Mr. E. V. Evans of "throwing them in the water and making them swim." This school holds that while it is all to the good if the potential manager reads suitable literature, it is believed that those who might make good can be selected while quite young and can be given the necessary experience by their firms. The future manager is not necessarily an engineer; he may be a chemist, a biologist, or a physicist—the only criterion is his personality. The other school which was supported by most of the speeches at the meeting of the Institution of Chemical Engineers, is that efficient managers can be turned out like chemists or engineers by a suitable university education, or a suitable course of private study. This school of thought appears disposed to reserve the managerial chair for the practical engineer for the curious reason that the chemist and the more academic engineer are too accustomed to exact thinking to be able to "cut corners" and reach correct decisions without having every step proved beyond doubt. This school rightly points out that although most of our big businesses have been built up by geniuses born, not made, the supply of such men is insufficient, and must be supplemented by a supply of trained men well versed in the necessary sciences.

There is a great deal to be said for both these rival views. The manager must rely upon himself and in the outcome be prepared to back his own opinion and to see that his staff pulls their weight in the policy he alone has decided. Obviously, those men who are afraid of responsibility, and who are not sturdy individualists in the sense of being prepared to stand four-square upon their own feet, cannot hope to make successful managers. To that extent selection for training is possible, and indeed desirable.

While early detection of the positive possession of these qualities is possible, there exist many individuals who develop late, and who may be missed by the selectors on that account. Many a man feels that he has the capacity for holding the higher posts successfully if he but had the chance to show it. If training might enable these latent qualities to be brought out, should we not give the opportunity to every junior? Opinion varies as to when that training should be given; whether before entering, or while engaged in, industry.

Whatever the effects of the Anglo-American Trade Agreement may be in the economic sphere, it certainly represents, both symbolically and in fact, an example of what can be achieved by free negotiation in a world which politically and economically is sorely in need of good will.

—Peter F. Bennett.

NOTES AND COMMENTS

Medicine Stamp Duty

THE Chancellor of the Exchequer's proposal to repeal the Medicine Stamp Duty in the forthcoming Finance Act is likely to meet with considerable opposition from the Pharmaceutical Society and the Society has appointed a committee to consider what steps should be taken. In a statement made by the president of the Society, it is pointed out that the object of the original legislation was the dual one of obtaining revenue and of protecting the public from the dangers inherent in mishandled drugs. The effect of the repeal of the Medicine Stamp Acts, the president said, would be to encourage a return to secret remedies, to encourage the use of medicines far beyond the needs of the community, and to divert to the untrained and unqualified vendor a greater proportion of the handling of drugs. It appears that the repeal of the duty will make little difference to the reputable manufacturer except in so far as it opens the door to unscrupulous brethren. The difficulty would, of course, be solved if it were made obligatory for the compositions of all pharmaceutical preparations to be disclosed by the manufacturer. Normally this ought not to result in any loss to the manufacturer. He can seldom obtain patent protection for his product and is thus encouraged to keep compositions as secret as possible, but most preparations are amenable to analysis, and consequently imitation, by competitors.

Purity of Water Supplies

A STRONG reminder of the vigilance which should be kept on the purity of the public water supplies is contained in the annual report of the Water Pollution Research Board. The Board refers to the outbreak of typhoid fever at Croydon, when 310 cases were notified of which 42 were fatal, caused by infection of a portion of the public water supply of the district. It focused attention on the importance of taking all practicable steps to protect sources of water supply from pollution, of systematic treatment of supplies in any way liable to pollution, and, in particular, of frequent examination of samples to ensure that the treatment is adequate. The Board adds: "Any neglect by water supply undertakings of the lessons to be learnt from the Croydon outbreak would be deplorable." The stress laid on the necessity for frequent examination of samples, contained in the Board's precise statement of the position, is especially valuable, for it cannot yet be said that every water undertaking in the country is adequately provided, both in personnel and equipment, to undertake proper chemical and bacteriological analyses of their supplies. Until that is so, the lessons of the Croydon outbreak cannot be said to have been thoroughly learnt.

Increase in Employment

THOSE who reject the doctrine of the inevitability of war as unwarranted by the facts can take comfort from the latest Ministry of Labour return relating to employment in the middle of April. There were approximately 100,000 fewer unemployed and over a quarter of a million more persons in employment than a year before. These figures are highly satisfactory in themselves and they become even more convincing when subjected to detailed analysis. It has been widely assumed that the re-armament programme in itself is capable of producing some

such result as this. The figures, however, for the various trades show that the activities of peace have contributed to the improvement at least as much as preparations for war. The woollen and worsted trades, for example, are known to have received large orders from the Government, and yet there was a positive decrease of employment in those industries. The hosiery and boot and shoe trades are having a similar experience. Even engineering accounts for the increased employment of only 12,000 out of a total of 395,000 between mid-January and mid-April. The improvement extends over a very wide range of normal trade activity supplemented undoubtedly by the re-armament programme. The only possible deduction to be drawn is that British industry, while shouldering the responsibility for national preparedness, maintains its confidence in a peaceful outcome of the present difficulties. Employers and workmen alike are getting on with their jobs and refusing to be rattled.

The Fading of Coloured Pigments

IN the course of an address to the London Section of the Oil and Colour Chemists' Association, Mr. K. Mackenzie-Richards made some interesting observations on the connection between the fastness to light of a coloured pigment and its chemical constitution. He said that this was a fascinating subject for research, but at the present state of knowledge one could not predict from the known make of a pigment what its fastness to light would be. A few general deductions, however, could be made. For the organic pigments, the introduction of an alkaline earth metal or ferrous metal usually enhanced light fastness, as did the presence of a nitro group or the introduction of chlorine into the molecule. The greatest resistance to light was shown by those compounds which contained a metallic group combined in the structure of the molecule itself, such as the iron in Prussian blue and the copper or nickel in phthalocyanines. He added that it would be most helpful if the structural formulae for more of the known organic pigments could be worked out.

Two Notable Centenaries

THIS year marks the centenaries of two inventions of exceptional significance. The centenary of photography will be the subject of a joint meeting of the Royal Society of Arts and the Royal Photographic Society on Wednesday next. Four papers will be read and an exhibition of photographs and early apparatus will be on view. It is particularly appropriate that the two societies should unite in this celebration as the first public exhibition of photographs was held in the house of the Society of Arts in December, 1852, and as a direct result of that exhibition the Photographic Society was founded early in the following year under the aegis of the Society of Arts. The second centenary is the discovery of the vulcanisation of rubber made almost simultaneously and independently by Hancock in England and Goodyear in America. The combination of sulphur with natural rubber gave a material of lasting elasticity and resistance to changes of temperature, two properties in which natural rubber was seriously deficient. This invention opened up a wide field of application for rubber as can be seen from the countless uses which the material finds to-day. It is interesting to note that of the two inventors of the process, Hancock applied for, and was granted, a patent, while Goodyear took no patent, believing presumably that at that time a patent specification was sometimes little more than an attraction to imitators.

Maleic Acid Manufacture

By
DR. LOUIS LIGHT

MALEIC acid and its anhydride are materials of growing importance in several branches of technology. Their principal outlet at present is in the synthetic resin industry* where maleic anhydride is condensed with glycerol and other polyhydric alcohols to give resins superior in some respects to the phthalic anhydride-glycerol type. Outside the resin field the production of succinic acid by catalytic reduction of maleic acid promises to acquire economic importance. Many other applications will undoubtedly be found as the price continues to fall to more and more attractive levels. Maleic acid has been proposed as the starting point for acrylic acid, malic acid and tartaric acid. The value of maleic acid as an antioxidant for fats has been demonstrated, but misgivings have been aroused by its toxicity, which approximates to that of oxalic acid.

Raw Materials of Manufacture.—Controlled oxidation of many ring and open chain compounds containing at least one double bond between carbon atoms has been found to yield maleic acid as the chief product or a by-product. If benzene vapour in admixture with a considerable excess of air or oxygen is brought into contact for a suitable time with a catalyst heated to the correct temperature, a good yield of maleic acid is obtained without any large proportion of by-products. On the other hand, the vapour phase oxidation of naphthalene will give a mixture of maleic and phthalic acids (or anhydrides) in proportions varying with the operating conditions, such as temperature of, and time of contact with, the catalyst. Other ring compounds of potential interest for maleic acid manufacture are acenaphthene, phenanthrene and anthracene. Of more immediate interest, next to benzene and naphthalene, is toluene.

The chief starting materials outside the benzenoid hydrocarbon group to merit attention are furfural, four-carbon open-chain saturated or unsaturated compounds and their oxygen-containing derivatives, cyclic diolefines (cyclopentadiene) and terpenes.

Manufacture from Benzenoid Hydrocarbons

Maleic Acid from Benzenoid Hydrocarbons.—Most of the maleic acid and anhydride now made in the United States is probably obtained by oxidation of benzene, toluene or naphthalene. The tendency will be to direct naphthalene oxidation in the direction of maleic rather than of phthalic acid, although not to the entire exclusion of the latter.

The foundations of the maleic acid industry appear to have been laid in the U.S.A. with the development by J. M. Weiss and C. R. Downs (U.S.P. 1,318,633 of April 8, 1919, assigned to The Barrett Co.) of a process for limiting the combustion of benzene so that disruption of the benzene ring stopped short at the four-carbon chain instead of proceeding uninterruptedly to carbon dioxide and water. They passed a benzene-air mixture through a tube immersed in a bath and partly filled with pumice impregnated with vanadium pentoxide and heated to 300-350° C. Quinone is an intermediate product in the formation of maleic acid.

An early improvement of C. R. Downs was the replacement of pumice as the catalyst support by aluminium granules (B.P. 153,877) which provide better adhesion, do not choke the chamber by flaking and conduct heat more rapidly. Other conditions being equal, the yield of maleic acid depends upon maintenance of the catalyst surface at the optimum temperature. Benzene oxidation is a highly exothermic reaction, oxidation to maleic acid theoretically liberating 10,500 B.T.U. per pound of benzene (as compared with 18,000 B.T.U. for complete combustion to carbon dioxide and water). The

metal catalyst support undoubtedly stores up less of the heat of reaction than does a material like pumice. Other cooling measures were nevertheless found necessary to obtain a satisfactory yield of maleic acid. C. R. Downs and C. G. Stupp, for example (U.S.P. 1,515,299), passed the benzene-air mixture over the vanadium oxide catalyst in numerous stages with cooling between each stage in order to prevent the temperature of the catalyst from rising above 400° C.

Condensing Out Maleic Acid in Stages

An elaboration of the scheme of Downs and Stupp described above for minimising the risk of over-heating of the reaction mixture has been described by A. O. Jaeger (U.S.P. 1,945,354, assigned to the Selden Co.). The benzene-oxygen mixture is passed through a series of catalyst chambers and the maleic acid condensed out of the vapours emerging from each chamber before they are passed on to the next. Crude tar phenol has also been oxidised to maleic and succinic acids in a battery converter of this type.

An improvement in the yield of maleic anhydride was obtained by employing a mixture of vanadium oxide and an oxide of the fifth or sixth periodic group as the catalyst in benzene oxidation and operating at a somewhat higher temperature than with vanadium oxide alone (U.S.P. 1,636,857, to A. E. Craver).

The oxidation of mono- or polycyclic hydrocarbons containing at least one side chain can be controlled to give a mixture containing maleic acid. According to D.R.P. 475,808 (The Barrett Co.) toluene yields a mixture of maleic acid, benzoic acid and benzaldehyde when contacted with vanadium oxide at 400-450° C. 402 kilos toluene warmed to 50° C. were vaporised into 884 kilos air and the mixture kept in contact with a vanadium oxide mass, the temperature of which was 410° C., for 16 hours (the gases were presumably circulated for this period). The yields per 100 kilos toluene were 2.9 kilos maleic acid, 7.7 kilos benzoic acid and 3.9 kilos benzaldehyde.

Maxted and Coke (B.P. 228,771) prepared a tin vanadate catalyst for benzene oxidation by precipitating ammonium vanadate with an aqueous solution of stannic chloride and drying at a temperature not exceeding 300° C. Passage of benzene with excess of air over this catalyst at the relatively low temperature of 290° resulted in maleic acid formation. In a process of the Consortium für Elektrochemische Industrie (D.R.P. 518,391), a mixture of benzene and oxidising gas emerges at high velocity from a very narrow orifice and impinges upon a hot fireclay surface coated with fused vanadic acid.

Oxidation of benzene in presence of vanadium oxide deposited on pumice (which was used in the U.S.A. before the aluminium carrier was adopted) has again been studied, by Zalkind and Zolotarev (*J. Applied Chem.* (U.S.S.R.), 1933, 6, 681). The yield of maleic anhydride (calculated upon the benzene) was 14-17 per cent. when air was passed through benzene at 15° C., the mixture pre-heated to 360° C. and oxidation in contact with the pumice mass effected at 410-430° C. Quinone was identified as an intermediate product.

Use of Ammonium Vanadate Catalyst

An electrically heated iron chamber and a catalyst prepared by precipitating ammonium vanadate upon grog lumps and activating at 450° C. in an air-oxygen current were used in the experimental method described by Pigulevskii and Yarzhemakaya (*J. Gen. Chem.* (U.S.S.R.), 1935, 5, 1,620). In this apparatus, which was three-quarters filled with the catalyst mass, benzene was oxidised to maleic acid in the maximum yield of 38 per cent. at a temperature of 450° C. and a contact period of less than one second in an oxygen atmosphere. These results are confirmed by Pigulevskii and

* According to statistics recently published by the U.S. Tariff Commission the output of maleic acid resins in the U.S.A. in 1937 was 2,804,000 lbs. at a value of about \$500,000.

Gulyaeva (*Trans. Exper. Res. Lab. "Khemgas," Materials in Cracking and Chemical Treatment of Cracking Products* (U.S.S.R.), 1936, 3, 185-196; Chemical Abstracts, 1937, 5, 317).

A study of different catalysts for conversion of maleic acid into benzene has led Kiprianov and Chostak (*J. Prikl. Khim.*, 1938, 471) to the conclusion that the best results are secured with a mixture of vanadium pentoxide, molybdenum trioxide and cobalt oxide (CO_2O_3). Molybdenum is a metal of the sixth periodic group so that this investigation confirms to some extent the above-noted claim of A. E. Craver in U.S.P. 1,636,857.

Oxidation of More Complex Hydrocarbons

The oxidation of more complex hydrocarbons, such as acenaphthene, naphthalene and anthracene, to maleic anhydride can be accomplished in a several-stage degradation process in which a different catalyst is used at each stage (I. G. Farbenindustrie, B.P. 268,775; Swiss P. 127,034). In the case of acenaphthene the products of repeated oxidation were naphthalic acid, naphthalene, phthalic anhydride, benzoic acid, benzene, quinone, maleic acid, acrylic acid and ethylene. The following details are given of the production of maleic anhydride from naphthalene: Air and naphthalene are passed over vanadium oxide at 400°C ., the reaction product cooled to 390°C . and passed over a contact mass containing oxides of zinc, cadmium and aluminium. Finally the vapours are mixed with pre-heated air and passed over salts of vanadic acid at 410°C . The maleic anhydride is isolated by cooling or passed directly into water to form the acid.

According to R. Shimose (*Sci. Papers Inst. Phys. Chem. Research*, Tokio, 1931, 15, 251; Chem. Abstracts, 25, 4,694) the main products of catalytic oxidation of decahydronaphthalene in the vapour phase were maleic and phthalic acids.

Polynuclear compounds in which the benzene rings are only linked by a single bridge can also be oxidised to maleic acid at a temperature of $400-550^\circ\text{C}$. (National Aniline and Chemical Co., U.S.P. 2,114,798). Diphenyl, for example, is treated in a converter similar to that used in benzene or naphthalene oxidation with 25 to 35 times its weight of air under a pressure of 2.5 atmospheres absolute. Other starting materials in this class are ditolyl, triphenylmethane, diphenyl carbinol and diphenylbenzene.

A considerable amount of maleic anhydride is now produced, together with phthalic anhydride in the controlled oxidation of naphthalene vapour. In the process of F. Porter (U.S.P. 2,071,357 assigned to the Solvay Process Co.) the mixture of maleic and phthalic anhydride vapours is run at a temperature above 135°C . into a 5 per cent. aqueous slurry of phthalic acid. In consequence of the sparing solubility of phthalic acid in water, a continuous separation takes place while the maleic acid remains in solution. When the mixed vapours are allowed to condense in cooling chambers before separation, steps must be taken to prevent choking. Mechanical means of removing continuously the condensate from the chamber are described in U.S.P. 2,067,019 (National Aniline and Chemical Co.).

Purification of Crude Maleic Acid

Purification of Crude Maleic Acid.—The intensely coloured iron salts can be removed by treating with a cyanide or ferrocyanide, filtering and concentrating the decolourised filtrate (U.S.P. 1,900,680 of H. W. Witzel and The Selden Co.). The acid can be purified from higher boiling products (notably phthalic and fumaric acids) by distillation at low pressures and temperatures to avoid isomerisation to fumaric acid (U.S.P. 1,901,914 of J. W. Livingstone and Monsanto Chemical Works; U.S.P. 1,966,852 of M. N. Dvornikoff and Monsanto Chemical Works). It has also been proposed to extract coloured impurities in the crude aqueous solution with a suitable water-immiscible phenol (U.S.P. 1,930,054 of A.O. Jaeger, L. C. Daniels and The Selden Co.). Advantage has been taken of the low water-solubility of sodium acid maleate in separating maleic acid from phthalic acid (U.S.P. 1,945,246 of H. W. Witzel and The Selden Co.).

Maleic Acid from Furfural.—The acid was obtained in an early process of C. H. Boehringer Sohn (D.R.P. 478,726; B.P. 285,426) by passing a mixture of furfural, steam, oxygen and air through a tube heated to $300-350^\circ\text{C}$. and containing zinc vanadate coated on aluminium granules. It was soon found (D.R.P. 539,269; B.P. 297,667 of C. H. Boehringer Sohn) that the process could be operated at the much lower temperature of $150-250^\circ\text{C}$. by using an enormous excess of air. A 70-80 per cent. yield of maleic acid or anhydride was obtained by atomising 2 kilos furfural per hour into 220 cubic metres of air and passing the mixture over vanadium pentoxide deposited on porcelain potsherds and heated to 250°C .

A mixture of maleic acid, maleic anhydride and formaldehyde was obtained by the Consortium für Elektrochemische Industrie (D.R.P. 518,391) by allowing a mixture of furfural and a very large excess of oxygen to emerge at high velocity from a very narrow orifice and impinge upon a heated fire-clay surface coated with fused vanadic acid. The same process, as has been seen, was proposed with benzene as starting material.

Japanese workers made a close study of the electrolytic oxidation of furfural to maleic acid some years ago and a process was eventually patented by the firm of Zaidan Hojin Rikagaku Kenkyujo (B.P. 253,877; U.S.P. 1,700,297; D.R.P. 469,234). The apparatus consisted of a two-cell electrolyser with a porous diaphragm, an anode of lead peroxide and a cathode in the form of a lead coil through which a cooling liquid could be circulated. Furfural distributed in 5 per cent. acid was placed in the anode cell and a 10 per cent. solution of sulphuric acid in the cathode cell. Electrolysis was commenced at a temperature of 35°C . and a current density of 0.06 amps. per sq. cm. and continued until the anolyte no longer gave a reaction with aniline acetate. Maleic acid in a yield of 75 per cent. was recovered from the anode liquid by concentration. A mixture of succinic and maleic acids (4:1) is reputed to be obtained if metallic lead is used for both anode and cathode and electrolysis carried out at the much lower current density of 0.02 amps. per sq. cm.

Oxidation of Furfural by Chlorine Dioxide

A good yield of maleic acid, it is interesting to note, was obtained on the experimental scale by oxidising freshly distilled furfural in the dark with chlorine dioxide in presence of calcium carbonate and a trace of vanadium chloride (E. Schmidt, *Berichte*, 1927, 60, 1,671). Maleic acid obtained by oxidation of furfural can be purified from the mesotartaric acid formed as a by-product by fractional precipitation with sodium and potassium hydroxides (U.S.P. 1,945,246 to H. W. Witzel and The Selden Co.).

Oxidation of Open-Chain Compounds.—The heat evolved in the oxidation of crotonaldehyde or crotonic acid to maleic acid is much less than in benzene oxidation so that the process is more easily controlled. The I. G. Farbenindustrie (B.P. 369,963; D.R.P. 561,081; F.P. 721,763; U.S.P. 1,880,901) claim to obtain good yields of maleic acid or anhydride by bringing the vapours of either crotonaldehyde or crotonic acid into contact with oxygen or an oxygen containing gas in presence of a catalyst at a temperature of $200-500^\circ\text{C}$. A stream of 15 litres air was passed for one hour through crotonaldehyde heated to 30°C . This stream was combined with another air stream (flowing at the rate of 150 litres per hour) and the mixture passed at 350°C . over a mixture of vanadium and molybdenum oxides prepared from 10 parts ammonium vanadate and 5 parts molybdic acid and supported on granulated aluminium.

Quite recently the efficiency of vanadium oxide itself as the catalyst in crotonaldehyde conversion, when deposited on aluminium granules, has been demonstrated by W. L. Faith and A. M. Schaible (*J.A.C.S.*, 1938, 60, 52). Better yields were obtained than with vanadium oxide deposited on pumice stone, no doubt because of the superior heat-conductivity of aluminium. Maleic acid in the maximum yield of 45 per

cent. was obtained from air and crotonaldehyde in the molecular ratio of 520 to 1.

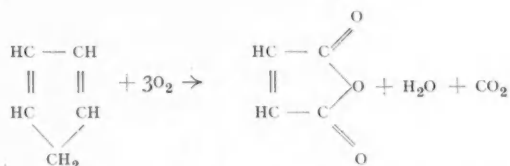
In the process of O. Drossbach, K. Huttner and the I. G. Farbenindustrie (D.R.P. 646,704) the vapours of butyl alcohol or butylene glycol in admixture with oxygen or an oxygen-containing gas are passed over a catalyst at 250-450° C. An air stream of 180 litres per hour was passed through butylene glycol (heated to 100° C.) to give a mix containing 16 grams butylene glycol per cubic metre of air, which was passed over a catalyst prepared as follows: 11 parts ammonium molybdate, 3 parts vanadic acid and 4 parts oxalic acid were dispersed in 70 parts water, the mixture applied to pumice granules (3 to 4 mm.), dried and activated for 4 hours at 360° C.

Further Process of Batyl Alcohol Oxidation

Oxidation of butyl alcohol (and butylenes) is also the subject of B.P. 465,848 (F.P. 803,443) assigned by C. H. Waters to Carbide and Carbon Chemicals Corporation. Normal and secondary butyl alcohol were vaporised by diffusing nitrogen at the rate of 30 to 36 litres per hour into the alcohol tank and the vapours combined with 400 litres air were passed into a reaction chamber containing tin vanadate and molybdenum oxide deposited on porous silica stone and maintained at a temperature of 300-310° C. The same process is stated to be applicable to butadienes.

Maleic acid was reported as the main product of catalytic oxidation of *n*-pentane, *n*-heptane, *n*-octane, 2-amylene, 2-isoamylene and di-isoamyl by Shimrose (*Sci. Papers Inst. Phys. Chem. Research*, Tokio; Chem. Abstracts, 25, 4,694).

Oxidation of Cyclic Dioléfines to Maleic Anhydride.—Cyclopentadiene is a cyclic dioléfine available at a low price from distillation of certain fractions of cracked petroleum. Its oxidation to maleic anhydride has been described by C. Conover in U.S.P. 2,079,490 (assigned to Monsanto Chemical Co.).



Oxidation is effected in admixture with 20 times (or more) its weight of air at 400-525° C. in presence of a vanadium oxide catalyst. Any of the benzene-oxidation catalysts, particularly those containing metals of the 5th or 6th periodic group, are applicable in this reaction to the oxidation of any cyclic dioléfine containing at least 5 carbon atoms.

Oxidation of Terpenes to Maleic Anhydride.—Turpentine oil vapour (or pine oil) has been treated with oxygen at 250-500° C. in presence of a catalyst containing an oxide of vanadium, molybdenum, tungsten, uranium or tin or one of their salts (U.S.P. 2,030,802 of W. Schrauth and Deutsche Hydrierwerke A.G.). Sulphate turpentine was sprayed into the reaction chamber at a temperature exceeding 200° C. and there mixed with hot air before bringing into contact with the catalyst heated to 350-400° C. 100 cubic metres of air were used per kilo of oil.

BRITISH GLYCERINE MANUFACTURERS, LTD.

In the Company's Court on Monday, Mr. Justice Crossman had before him a petition for the compulsory winding up of British Glycerine Manufacturers, Ltd.

Counsel said this was a creditor's petition based on a debt of £600. The matter had not been settled and there had been very little negotiations.

Counsel for the company said the company had made an offer. The trade creditors would be paid in full. The present petition was based on a service agreement.

Council for the petitioner pressed for a compulsory order and his lordship made an order accordingly.

Society of Public Analysts and Other Analytical Chemists

Election of Members—Abstracts of Papers Read

AN ordinary meeting of the Society of Public Analysts and Other Analytical Chemists was held at Burlington House, on May 3, the President, Professor W. H. Roberts, being in the chair. The following were elected members of the Society: J. B. Firth, D.Sc., M.I.Chem.E., F.I.C.; G. Isles; and C. H. Wordsworth, B.Sc., A.I.C.

The following three papers were presented and discussed: *Extract of Malt with Cod Liver Oil: Determination of Oil and Vitamin A.* By D. C. Garratt, B.Sc., Ph.D., F.I.C.

Various methods for the determination of oil in extract of malt with cod-liver oil have been considered with a view to accurate determination both of the oil and the vitamin A content; those most suitable have been critically compared. Full recovery of both oil and vitamin A could be obtained by the Rose-Gottlieb method of extraction of oil provided precautions were taken against oxidation.

The Presence of Leuco-anthocyanins in Criollo Cacao. By the late A. W. Knapp, M.Sc., M.I.Chem.E., F.I.C., and J. F. Hearne, A.I.C.

Colour differences between unfermented cacao beans of the Criollo and Forastero varieties are discussed and recent work concerning the anthocyanin pigments of Forastero cacao is summarised. The question of anthocyanin precursors in Criollo cacao is considered and the nature of the brownish red substances which may be developed from white Criollo beans by acid treatment has been examined in greater detail than hitherto. From parts of a Criollo pod and beans, purified solutions of certain pigments have been prepared by acid treatment; these give reactions identical with those of solutions of cyanidin chloride prepared from Forastero cacao. It is concluded that each part of the Criollo pod examined contains a leuco-anthocyanin which yields cyanidin.

Notes on the Examination of Textiles in cases of suspected Dermatitis. By H. E. Cox, Ph.D., D.Sc., F.I.C.

Difficult problems are presented by garments suspected of causing dermatitis. Some recent judgments in the courts make it necessary not only to consider what substances are present, but in what quantity and what are the normal contents of such substances. It is necessary to consider acidity, sulphur dioxide and chromium, for example, quantitatively in relation to the particular type of material. Other metals, too, must be considered in relation to their solubility. In the examination of dyed garments alleged to contain this or that intermediate it is particularly necessary to ascertain the nature of the dyes present and their probable constituents so as to recognise what substances are liable to be present and what compounds may interfere with identification reactions.

Letters to the Editor

"Equipping the Chemical Laboratory"—Electric Furnaces

SIR.—We have read with interest the article on page 317 of your issue of April 29, and particularly that part which deals with heating equipment.

From the wording of that particular part, it seems to us that a mistaken impression may be reached that electric furnaces are only made for temperatures up to 1,000° C. with automatic temperature control. We appreciate that it is intended to refer solely to furnaces with expansion type thermostat control, but we should like to point out that we have manufactured for many years furnaces for temperatures up to 1,350° C. with hand or with automatic control. Furnaces for special purposes are also made for temperatures considerably in excess of the last mentioned temperature.—Yours faithfully,

Wild-Barfield Electric Furnaces, Ltd., J. E. ORAM.
Elecfurn Works,
North Road, Holloway, N.7.

The Photographic Emulsion

Its Contribution to Science and Industry

DR. OLAF BLOCH, chief chemist, Ilford Ltd., delivered the 29th annual May lecture before the Institute of Metals on Wednesday, his subject being "The Photographic Emulsion and its Contribution to Science and Industry." Dr. Cecil H. Desch, F.R.S., President of the Institute, was in the chair. Dr. Bloch said that the photographic emulsion consists of a finely divided suspension of one or more of the halides of silver in gelatin, and in its preparation every detail, from the mixing of the chemicals to the coating of the finished emulsion upon its support and the final dry process, is important and vitally affects the quality and the characteristics of the product.

Manufacturing Stages

Two stages in manufacture are recognised, the first taking place just after the formation of the silver halides when the larger grains are allowed to grow at the expense of the smaller (Ostwald ripening) and the second stage, when, after washing out the soluble salts, the emulsion is digested to bring about an increase in sensitivity. The ultimate reasons for the growth of sensitivity are still obscure, but Sheppard's work has shown the importance of sulphur compounds in the gelatin itself. It is believed that complexes are formed which break down to form silver sulphide. Gelatin acts as a medium for holding the silver halides in suspension and as a sensitiser, and it has yet a further function because it acts as a protective colloid during the attack of the developer. Without it, the grains would be reduced more or less indiscriminately and not in accordance with the light action.

There are two broad theories of development, one of which suggests that the process consists in the deposition of silver upon the latent image from the developer which has first become supersaturated, while the second postulates increased adsorption at the points constituting the latent image with consequent increase of developer activity in these regions.

As to the latent image, we are still without definite proof of its nature. Exposure is believed to result in the liberation of electrons from bromine ions. These electrons move about in the crystal lattice giving rise to the phenomenon of photo-conductance and when they come into contact with specks of silver or silver sulphide they are held fast—the silver or silver sulphide becomes negatively charged and can then attract silver ions which are also free to move in the crystal lattice. When the nucleus becomes sufficiently large by attachment of silver brought about in this way the grains become developable. Among other things, this theory seems to account adequately for the failure of the reciprocity law, that is, for the fact that the photographic effect of a constant product of time and intensity varies according to the level of intensity at which the exposure is made, because at low light intensities as many silver ions may be expected to leave the speck as are attracted to it.

Dyestuff Sensitisation

Silver bromide crystals become much more sensitive by the inclusion in them of a small amount of iodide, but the great advance which has been made in emulsion making technique is largely due to the employment of dye-sensitisers, which, adsorbed to the grain surface, markedly affect the sensitivity, particularly in the region of absorption of the dye. There are other dyestuffs which act as desensitisers and Kendall has put forward a theory which attempts to link behaviour with constitution. By means of dyestuffs it is now possible to sensitise silver halides right throughout the spectrum and into the infra-red beyond.

The second part of the lecture dealt with the applications of photography to industry, and mention was made of a number of the most important fields in which the photographic plate has contributed to the advancement of knowledge. Astronomy, for example, relies very largely upon it.

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Power Alcohol in Madras

FROM OUR CORRESPONDENT.

THE Committee appointed by the Madras Government to report on the possibilities of the production of power alcohol from molasses has now submitted its report. The Committee is unanimously of the opinion that the manufacture of power alcohol and its admixture with petrol would in the present state of the sugar industry in India be an economic proposition, and that it should be encouraged and developed by the Government in national interests. The Committee feels that even if it is eventually found that power alcohol cannot be marketed at the same price as petrol, the Government of India should, in national interests, be urged to face some loss of revenue and to levy a lower duty on power alcohol than on petrol.

The Committee is satisfied from experience gained in other countries and from the results of such experiments as have been carried out in India, that absolute alcohol can be mixed in a satisfactory manner with petrol so as to be used in ordinary cars without any alterations or intricate adjustments being necessary. The Committee has no hesitation in recommending that legislation to enforce such mixing is justifiable in national interests. Although blends containing 25 per cent. absolute alcohol have been employed with success in running motor vehicles, the Committee deems it advisable in view of the shortage of molasses and other reasons to make a beginning with 10 to 15 per cent. of power alcohol in those areas where power alcohol distilleries would be permitted to be started, and the Power Alcohol Act enforced.

The purchase from the Government by the petrol distributing companies of a quantity of alcohol in proportion to the sales of petrol in the areas notified by the Government, and the mixing of such alcohol with petrol in the proportion prescribed by the Government should be enforced in the opinion of the Committee by a special Act. The Government should also undertake, says the Committee, to purchase from the power alcohol factories, a stipulated quantity of alcohol at a price fixed for the year, and sell the same to the petrol distributing companies in the notified areas at prices fixed by the Government with reference to the local price of petrol in those areas. The margin of profit, if any, in those transactions should be credited by the Government to a separate fund which might be used for the purpose of developing the power alcohol industry in the Province.

METHYL bromide has proved efficacious in the disinfection of materials when applied in sufficiently high concentration in a partial vacuum. With a dose of 50 grams acid-free methyl bromide per cubic metre, all insects and larvae are killed after exposure to the vapour for 90 minutes under a pressure of 50 mm. (P. Lepeste, *C. R. Acad. Agric. France*, 42, 783.)

(Continued from preceding column.)

By means of the camera and spectroscope in association we are able, on the one hand, to study the constitution of the atmospheres of the planets, and on the other, to determine the merest traces of impurity in food-stuffs. The photographic emulsion responds not only to the visible spectrum but to the ultra-violet and to X-rays, and it can be sensitised to radiations beyond the red so that observations extend far beyond the limits originally set by the senses, and, further, the grains of the emulsion are rendered developable by the passage of the fast moving particles ejected from disintegrating atoms. Investigations into the nature of cosmic rays are also being actively carried on by the aid of the photographic emulsion. For this work special emulsions have to be prepared, but even these special products are only brothers and sisters (with peculiar aptitudes and characteristics) of the better known members of a large emulsion family who serve mankind in the making of illustrations for books, in survey work, in photo-micrography and phototelegraphy, for ordinary picture making and record work, and in nearly every field of research.

Purification of Chlorine*

By

WALKER PENFIELD and R. E. CUSHING

THE use of chlorine in its liquefied anhydrous form for water sterilisation has increased steadily and may be conservatively stated as the most important advance in water sanitation within the last thirty years. An unusual chemical purification problem has been created by the mechanical equipment used to dispense chlorine gas into water, and one solution of this problem is outlined here. These accurate mechanisms are inherently gas-flow control devices which cannot operate satisfactorily if foreign material is deposited in orifices or delicate moving parts. This quality need is pronounced in smaller machines owing to more restricted gas flow passages.

The substances causing this trouble are commonly called "taffy" and are of negligible diluent significance. They consist largely of chlorinated organic compounds with vapour pressures permitting sublimation at room temperatures. Seldom are they present to a greater extent than 0.2 per cent. by weight, even in liquid chlorine which has not been specially processed to remove them.

First efforts to solve this problem were directed at scrupulous cleanliness of shipping containers before reloading, in order that reasonably pure liquid chlorine would not become contaminated by foreign material in the cylinder; equipment operators were also instructed in the importance of careful maintenance as a trouble preventative. Field investigations of "impure chlorine" complaints showed clearly that a majority of these troubles were due to circumstances beyond control of the manufacturer whose chlorine was being used. (*J. Am. Water Works Assoc.*, Nov., 1934).

Causes of Chlorinator Plugging

Chlorinator plugging was usually found to be due to a number of things, combined or separate; for example, atmospheric moisture might enter the machine during shutdowns, lubricants and cleaning solvents might be left in the machine after cleaning, lubricants and packing might be forced from packing chambers into the apparatus by unwise tension on packing glands, pressure gauge protective diaphragms might become ruptured and empty diaphragm oil into the machine, or taffy deposition of several months' chlorine flow might suddenly be redissolved from harmless points by condensing droplets of liquid chlorine and swept along to the first point of gas expansion and there deposited. These operating difficulties, arising from maintenance errors or negligence, produced immediate and mystifying plugging which was frequently ascribed to the chlorine in use at that particular time.

This problem to-day is not confined solely to water or sewage plants, but is encountered also in industrial plants whose equipment is of such nature as to be affected by organic impurities. Where chlorine is dispensed into a process as a gas, the evaporators, expansion tanks (gas reservoirs), and flow-meters are all subject to troubles which municipal customers protest. Such equipment is often found with an interior coating of copious quantities of crystalline material and, in the bottom, a pool of reddish brown pungent liquid. On exposure to air this liquid evaporates readily and leaves a deposit of typical taffy.

It became more and more apparent that the problem was being transferred to the chlorine manufacturer, and good judgment indicated the production for customers of liquid chlorine of such quality as to reduce satisfactorily the troubles caused by it and free it from suspicion in case of service interruptions, even though these were due to maintenance negligence or faulty equipment design. The problem stated in this manner has been accepted as inescapable by some manufacturers, and marketable chlorine, intended for use through gas-dispensing ap-

paratus, is to-day being purged of its wax-forming impurities.

The impurities consist of a number of chlorinated organic compounds and, where moisture has entered the system, some ferric chloride. A special analytical method has been developed to evaluate these impurities. Examination of the resulting residue shows it to consist of a pool of chloroform and carbon tetrachloride, in which is dissolved a number of volatile solids; the most frequent of them are hexachlorobenzene and hexachlorethane (*J. Am. Water Works Assoc.*, Oct., 1938).

Explanation of Movement of Impurities in Equipment

The subliming nature of these solid fractions makes it less difficult to explain their movement from place to place in the chlorine equipment. A reasonable explanation is that, when chlorine gas is dispensed through the chlorinator by withdrawing gas from a cylinder at room temperature, the chloroform and carbon tetrachloride components of this small impurities fraction readily volatilise and pass out with the gas. Also, under ideal conditions, the volatile-solid chlorinated hydrocarbons are carried over with the gas and later deposited at the first point of pressure reduction (cooling) in the chlorinator.

Experience to date indicates that liquid chlorine, which has been given excellent handling in a chlorine plant but not specially purged of these impurities, may on examination show the concentration residues to be as high as 0.2 per cent. by weight. A typical analysis of such chlorine, in per cent., by weight, is as follows:

Total impurities	0.1748
Br	0.0095
CHCl ₃	0.0668
CHCl ₃ -solubles*	0.0326

* Largely hexachlorethane or hexachlorobenzene

Various methods have been proposed and tried for the purpose of removing chlorinated organic compounds from liquid chlorine. We shall deal, here, however, only with the development and operation of a process which may be stated essentially as washing impurities out of dry raw chlorine gas with liquid chlorine. (U.S.P. 2,077,310).

From boiling point data and from observation of chlorine purity in stage liquefaction, strong indications were noted that liquid chlorine is a satisfactory solvent for the impurities. To accomplish this in a practical manner, two methods appeared feasible—fractional condensation and fractional distillation.

Development of Column

Since, in any event, it was necessary to condense a portion of the purified gas, as wash liquor for the raw gas, the first apparatus set up was a partial condenser. It was believed that by utilising the difference in boiling points, chloroform and carbon tetrachloride could be condensed out of the chlorine, carrying with them in solution the taffy-forming compounds.

This was effected on a large scale with chlorine gas at 25 pounds gauge pressure through double-pipe coolers under controlled conditions such that the temperature of the chlorine gas was lowered until a very small quantity (1 to 3 per cent.) of the chlorine condensed. On subsequent condensation, the remaining chlorine was found to be substantially purer than that condensed from the raw dry gas.

It soon became evident that this apparatus would become coated with impurities and thus interfere with heat transfer and the passage of the gas. Equipment was redesigned and placed in operation; it consisted of a vertical cylindrical heat exchanger containing a large number of tubes in which the refrigerant was held, and around which raw dry chlorine

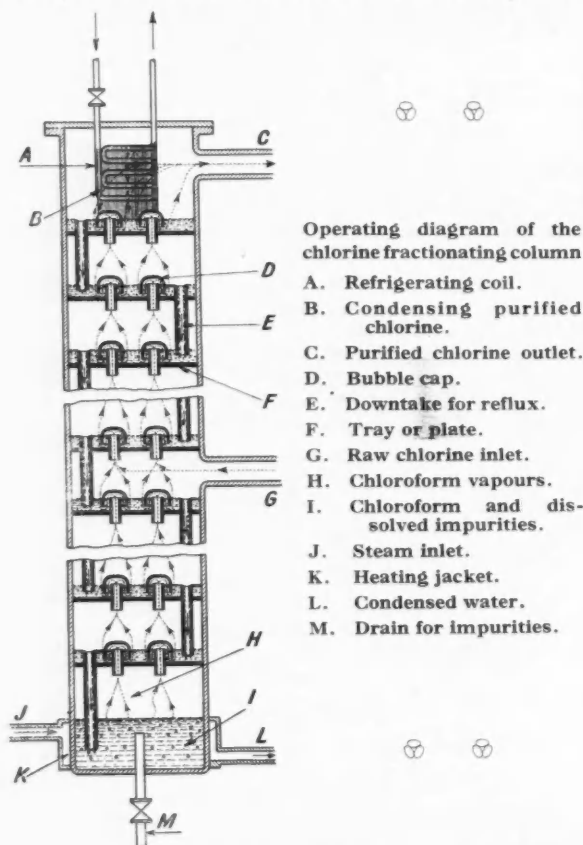
* From *Industrial and Engineering Chemistry* April, 1939.

gas passed en route to the condensers. A large number of baffles ensured good contact of the chlorine with the refrigerating tubes. Warm chlorine gas admitted to the bottom of this exchanger flowed upward over the baffles and was cooled until a portion liquefied, ran down through the column, and scrubbed the influent gas. This permitted a certain amount of fractional distillation since more chlorine than impurities was evaporated by the warm influent gas; the impurities continued to flow to the bottom, from which they were removed as a liquid containing, in addition, a small amount of liquid chlorine.

Fractionating Column of Special Design

Results, although encouraging, were not so satisfactory as studies indicated could be attained. A better regulated system appeared necessary, and to accomplish this a fractionating column of special design was considered.

Fractional distillation in its simplest form consists of permitting an interaction between the material to be separated



in the liquid state and that in the vapour state, where the liquid of a higher purity contains a lower concentration of the undesirable impurities than does the vapour. It is applied, of course, to the separation of two components having different boiling points. Considering a single step in this process, the purified liquid comes in contact with a less pure vapour. Temperature conditions are so maintained that a portion of the higher boiling point compound is caused to condense. The heat of condensation has a tendency to raise the temperature of the body of the liquid, and as a result of this liberation of heat an appropriate portion of the liquid with the lower boiling point is evaporated. In practice, this operation is caused to take place through a large number of steps.

The apparatus used for fractional distillation is usually a tall cylindrical tower which may be packed with rings or balls or irregular filling bodies which present a large surface over which the liquid may run and in contact with

which the vapour may pass. In other forms the tower contains a relatively large number of sieves or perforated plates which have the same function as do the bodies in a packed tower, or the tower may contain a number of trays on which the liquid is held and up through which the gas is bubbled by means of caps. Each type of apparatus has its own advantages, but the bubble-cap plate towers appeared the most effective for the purpose.

In this work it was again assumed that a separation could be made between chloroform and chlorine. Because of a higher boiling point than chloroform, the other impurities would probably separate out with the chloroform, and be removed. Further, Raoult's law was assumed valid for the system pressure, namely, 40 pounds per square inch absolute. The chlorine-chloroform boiling point diagram was constructed according to Raoult's law and an equilibrium diagram drawn. From these data a so-called component table was calculated showing the pounds of materials per hour with respect to their mole percentage and mole fractions.

With a better understanding of the problem, the final fractionating column was built and placed in operation. It consisted of a tall, vertical, cylindrical, steel chamber. The details and operating diagram are shown in the figure. At the lower end is a steam-jacketed pot. At about a third of the distance from the bottom to the top is an influent nozzle for admitting the warm dry raw gas from the compressors. In the extreme top is a steel coil containing liquid carbon dioxide, the refrigerant. Just above this coil is the effluent nozzle through which the purified chlorine gas passes to be liquefied in subsequent operations.

Between the steam-jacketed bottom pot and the condensing coil in the top are located a number of plates or trays which carry the conventional design of bubble caps. These bubble caps permit the gas to be discharged below the surface of the liquid on each tray and ensure intimate contact between the gas passing upward and the liquid slowly flowing downward.

Chlorine gas is admitted under 25 pounds gauge pressure at temperatures ranging from 60° to 100° F., depending upon the season. Flowing upward through the column, the gas passes plate after plate, leaving in the liquid chlorine on each plate a small quantity of chloroform and other impurities. This matter is retained in the liquid chlorine by condensation of the impurities in it; their latent heat released upon condensation causes the evaporation of a corresponding quantity of chlorine. Also evaporated is the small amount of the impurities already dissolved in the liquid chlorine on the plate, but the net result of each step is an increased concentration in the liquid chlorine on that particular plate and a decreasing concentration in the effluent gas. The gas continues its upward flow through these repeated treatments, becoming purer and purer and receiving its final purification on the top plate.

After leaving the last plate, substantially all of the organic impurities have been removed and only pure chlorine gas remains, together with such noncondensable gases as may be present. This pure gas comes in contact with the refrigerated coil shown in the figure, and a portion of the chlorine condenses. The quantity condensed is governed by the temperature of the refrigerant and the capacity of the coil for extracting latent heat from the condensing chlorine. A suitable quantity condensed constitutes 15 per cent. by weight of the total chlorine passing through the unit. Larger quantities may be used, but it is not economical to do so. With smaller quantities a sacrifice of purity is encountered, which becomes greater as the quantity of chlorine condensed decreases.

Details of the Process

The details of the process may best be understood by beginning with the chlorine condensing on the coil and falling to the surface of the top plate. Gas passing through this plate loses by condensation a small quantity of impurities remaining in it. The volume of the plate liquid is not appre-

ciably changed since chlorine evaporates from the liquid in proportion to the impurities condensed. A constant supply of chlorine, however, is being fed to this plate because of the continuous condensation on the coil, and this excess is prevented from accumulating by means of an overflow pipe which leads to the next lower plate where another purification step takes place. Thus the liquid passes down through the column, performs successive stages of washing the up-flowing gas, and becomes dirtier after each step. On reaching a point just above the raw gaseous chlorine influent line, a considerable portion of this dirty liquid chlorine is evaporated immediately because of the superheat in the influent gas. Hence in considering the amount of chlorine to be liquefied by the top coil, a quantity is provided to sweep the condensed impurities on each tray downward into the bottom of the column and also to remove the superheat from the raw influent gas entering the column from the compressors.

When equilibrium conditions have been reached, the steam-jacketed pot will contain chloroform, holding in solution a quantity of the higher boiling point impurities. The application of heat through the steam jacket causes this chloroform to boil and evaporate, and its vapours to rise up through the lower plates. These vapours are at a relatively high temperature since boiling is taking place under pressure and the boiling point of the solution has been raised by the presence of solids dissolved in it.

Rising through the first plate, the vapours from the bottom pot pass through a mixture of liquid chlorine and impurities on this plate. Practically all of the chlorine is evaporated and some of the chloroform condenses. The chlorine so evaporated passes upward through the next plate, which contains a still colder mixture of chloroform, liquid chlorine, and impurities. Some of the chloroform in the gas is condensed and, as a result, more chlorine is evaporated. This process continues until a large portion of the chloroform has been condensed and the chlorine rising upward from the heated base of the column is approximately of the same composition as that of the raw influent chlorine gas.

The process, therefore, is continuous. Impurities are removed as a concentrated solution, and the impurities are continuously separated from the chlorine. In spite of the fact that fractionation is being applied to a mixture not considered of suitable concentration to effect good separation, the resulting product is remarkably pure. By the method of examination referred to in the foregoing discussion, a typical analysis of the purified liquid chlorine will be as follows (in per cent. by weight):

Br	0.0019
CHCl ₃ and CHCl ₃ -solubles	Slight odour
Total impurities	0.0097

Virtually none of the higher boiling substances (hexachloroethane, hexachlorobenzene, etc.), the so-called taffy, remain in this chlorine.

Chemical Matters in Parliament

Lead Mines Closed

In the House of Commons on May 9, Mr. Sexton asked the Secretary for Mines whether he was aware that the lead mines at Rookhope, Durham, had been closed, thus causing 100 per cent. unemployment in that small community; and whether the Government was prepared to assist production of lead in those mines by insisting on the use of home-produced lead in Government contracts thereby ensuring a supply of lead for armament manufacture in the event of war?

Mr. Lloyd replied that he regretted that the Stotsfield Burn and Boltsburn Lead Mines, Rookhope, both owned by the Weardale Lead Co., Ltd., at which 15 and 57 men respectively were employed, had closed down this year, the latter within the last few days. He was informed that 80 per cent. of the insured population of this community were now registered as unemployed, but he understood that the second mine might be re-opened if the market improved. As regards the second part of the question he did not think the suggested solution would be effective, as he was informed that the company had no difficulty in disposing of its output at current prices.

A VERDICT of "Death by Misadventure" was recorded at the inquest at St. Helens last week on Robert Colvin Ross, a research chemist who, as reported in THE CHEMICAL AGE last week, died from burns following an explosion at the Cowley Hill works of Pilkington Bros., Ltd., glass manufacturers. It was stated that for the last two months the firm had been experimenting with the salt bath method of toughening glass and Ross had taken part in the experiments. He was attempting to remove some broken glass from the bottom of the bath by using a long-handled scoop, when there was an explosion and a fountain of molten salt covered his head and shoulders. Dr. Moore, head of the Pilkington research establishment, said that examination of another piece of metal tubing which had been left over after the scoop had been constructed, showed that there was one-and-a-half ounces of moisture in the three-foot length. When the scoop was made the ends were sealed up, and assuming that there was a corresponding amount of moisture left inside the tubing, a high pressure of steam would be generated when the scoop was placed inside the bath, heated to such a temperature as it was.

Toxic Industrial Chemicals

Composition of Trade Name Products Should be Given Suggested in France

The Institute for Professional Diseases, a French medical organisation established to study the nature and prevention of industrial disease risks, has suggested to the French Government that toxic substances used in the chemical industries should be labelled as such. The matter has arisen in connection with trichlorethylene, which is sold, either pure or mixed with other products, under nearly a hundred different trade names in France, and is utilised in various industries. Workers are not therefore always aware of what they are handling and in many cases plant managers are not in a position to suggest proper precautions. The Institute suggests that if the chemical industry were obliged to give the composition of substances sold under trade names, such dangers could be avoided by the employment of suitable precautions. Alternatively, it might be possible to mention only the toxic constituents of such products, if their composition is to be kept secret.

In the arc process for the manufacture of hydrocyanic acid, replacement of methane by its higher homologues, hexane and octane, has been found by Swiss workers to lead to an appreciable increase in the yield per kilowatt hour. The same workers (Briner, Desbaillets and Wertheim) are investigating the possibility of reducing soot formation upon the electrodes by using a suitable hydrocarbon in the gas mixture and operating at low frequency. (*Helv. Chim. Acta*, 21, 859.)

THE Danish import restriction authorities announced recently that on the basis of recent statistics showing the stocks of important goods held in Denmark on December 31, the question as to whether these stocks were sufficient in the event of a period in which imports might be difficult had been discussed with the trading organisations. In accordance with these discussions requests for extra import licences for certain goods would be considered. The authorities were also willing to consider applications from firms which had hitherto not been acknowledged as importers on the condition that the continued acknowledgment of such importers would depend on whether the present issue was used. As a preliminary guide to importers as to what were deemed important goods, the following products were included in a list issued: calcinated soda, dutiable chemicals, ultramarine, indigo, aniline dyes, etc., duty free chemicals and salt.

Water Supplies and River Pollution

The Annual Report of the Water Pollution Research Board

THE annual report of the Water Pollution Research Board for the year ended June 30, 1938, issued on Thursday by the Department of Scientific and Industrial Research, again emphasises the necessity for constant vigilance on the part of those responsible for the supply of water to the public. The Board say that any neglect of the lessons to be learnt from the serious outbreak of typhoid fever at Croydon would be deplorable. The research undertaken under the supervision of the Board includes investigations on the treatment of water for public supply and for industrial purposes, the treatment and disposal of domestic sewage and industrial effluents, and on problems of pollution of rivers.

The discovery that acids, bases and salts can be removed from solution in water by means of certain synthetic resins has aroused widespread interest, both in this country and abroad and considerable progress has been made in the development of the resins for industrial purposes by commercial firms who have acquired licences for their manufacture and sale. The main applications of the resins up to the present have included the treatment of water to remove all or part of the dissolved salts; this had previously been possible only by more expensive methods, such as distillation. Utilisation of the resins for the removal of valuable substances such as metals from very dilute solutions, for example from industrial effluents, and for the removal of objectionable substances in very low concentration in water is also being developed rapidly. Recent work under the Board has shown that, under certain conditions, fluorides which are sometimes present in water in small concentrations may be removed by resins of one type; the fluorine is not readily removed, however, when other salts usually found in natural water are present. Removal of fluorine from water is of importance since evidence from various localities has indicated that the dental defect known as "mottled enamel" may be caused by drinking water containing fluorine to the extent of one part per million.

The investigation to determine the average quantity of lead taken up by certain types of water from lead pipes and fittings under conditions of household supply has been continued and tests have now been made on seventeen services in different parts of England and Scotland. The extent to which the water is contaminated by passage through lead pipes depends on the character of the water, the length and arrangement of the pipes, rate of flow of water and on other conditions. In consequence, large differences may occur from time to time in the concentration of lead in water withdrawn from any one service. In one of the tests over several weeks, the average concentration of lead in the water was as high as 0.5 part per million; this concentration is too high if risk of lead poisoning is to be avoided. Experiments are in progress on methods of treatment of waters with the object of reducing their action on mains and service pipes of different materials.

One of the most important of the Board's investigations is the work which is being carried out, in collaboration with the milk industry, on the treatment and disposal of waste waters from dairies and milk products factories. It has already been shown that these liquids, which are difficult to treat by the method of biological filtration as ordinarily applied at sewage disposal works, could be satisfactorily purified when passed at a controlled rate through two percolating filters in series; the order of the filters in series is reversed periodically in order to prevent the accumulation of excessive amounts of solid matter in the filters. During the past year the waste waters treated have contained whey washings, which are produced during the manufacture of cheese. These washings are rather more difficult to purify than milk washings, but effluents of excellent quality have been ob-

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NEW TECHNICAL BOOKS

THE ECONOMICS OF CHEMICAL INDUSTRIES. By Edward H. Hempel. Pp. 259. London: Chapman and Hall, 1938.

The purpose of this book is to familiarise the reader with the characteristic background and the economics common to the American chemical industries. Its main aim is to demonstrate what has been done so far in chemical economics, and it describes the dangerous as well as the practical and useful economic policies which should be understood by those who actually are or hope to be dependent on the industry. A theoretical approach to the subject has been avoided; instead, the basic rules and methods have been described.

THE CHEMICAL FORMULARY. Volume IV. H. Bennett, editor-in-chief. Pp. 632. London: Chapman and Hall, Ltd. 1938.

New and additional formulæ gathered during the past year have accumulated in quantity sufficient to produce an additional volume to the three previous editions of this valuable work. The reputation which the first volume established, and subsequent volumes confirmed, in providing a solution of the need which existed for an up-to-date compilation of formulæ for chemical compounding and treatment, is enhanced by the publication of this latest edition. A feature of the early volumes was the way in which matter was made intelligible to the layman, enabling the non-chemical executive to gain a "speaking acquaintance" with products which he might be using or trying; this useful point is kept in mind in the fourth volume which includes a 15-page introduction written in a simple way so that anyone, regardless of technical education or experience, can start making simple products without any complicated or expensive machinery.

COLLOIDAL PHENOMENA. By Ernst A. Hauser. Pp. 294. London: McGraw-Hill Publishing Co., Ltd. 1938.

The author has set out to acquaint the reader, in as simple a manner as possible, with the modern viewpoints on colloidal science and to show where and why they must differ from those so successfully applied in physicochemistry. One object of these discussions is to attempt to eliminate the belief, still prevalent in some circles, that the science of colloids must be considered either as a development entirely independent of any other branch of known science or that colloidal phenomena must be fully explained in accordance with laws of classical chemistry or physics. It is the author's contention in this connection that colloids, as a result of their amazing development, can no longer be treated as a negligible side issue and that they consequently demand individual treatment. As the book does not pretend to be a complete treatise on colloids, but rather more of an introduction or guide to some of the recent points of view, the incorporation of the author's personal opinion is necessary to a great extent, but nevertheless its contents should prove of considerable value to the colloidal chemist.

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tained. With the method of treatment of two percolating filters in series, the quantity of polluting matter which can be treated daily in filters of a given size is considerably greater than is usual in the treatment of sewage at a sewage disposal works, where the liquid is passed through only one filter. This new method of operating percolating filters has also aroused great interest among those concerned with the treatment and disposal of town sewage.

The investigation on the River Mersey, which was begun in 1933 and occupied about 4 years, has been completed and a comprehensive special report has been published as Water Pollution Research Technical Paper No. 7. A full summary of the experiments, observations, and conclusions is included in the present report of the Board. Other investigations described in the report are concerned with the various processes in methods of treatment of sewage and with the bacteriology of water supplies.

Success of I.C.I. Reorganisation

Lord McGowan's Optimistic Speech at Company's Annual Meeting

IN his speech to the 12th annual general meeting of Imperial Chemical Industries, Ltd., the chairman, the Rt. Hon. Lord McGowan, K.B.E. D.C.L., LL.D., announced Lord Colwyn's resignation of his directorship, but said that he would resume his membership of the Dyestuffs Group Board. Lord McGowan also mentioned that during the year Mr. H. J. Mitchell had relinquished the office of President; Sir John Anderson and Mr. Peter Bennett had become Directors; but Sir John Anderson's appointment as Lord Privy Seal had soon deprived the Board of his services. The new scheme of organisation affecting the higher control of the company's affairs had functioned with outstanding success.

The chairman outlined the main features of the trade uncertainty in 1938 and instanced the effect on the company of depression in the iron and steel, textile and motor car industries. The rearmament programme had contributed to the maintenance of industrial activity in 1938, but the direct participation of I.C.I. in this was comparatively small. A good deal of work had been carried out for the Government, mainly in an advisory and supervisory capacity, for the erection of factories all the costs of which were for the account of the Government. The Board had felt it a duty to co-operate as fully as possible in this work, but a heavy strain had been imposed on the technical staff and the company had been deprived of many of their normal services for its own capital expenditure programme.

Progress of I.C.I. Companies in the Empire

Overseas, the increasingly strict trading regulations of many importing countries had limited the expansion and even maintenance of business. Lord McGowan described the difficulties of trading with Argentina, Brazil, Japan, China and Spain and said it was a relief to turn to the progress of the I.C.I. associated companies in the Empire. The Board were well satisfied with the results in Canada, South Africa, Australia and India. In South Africa, the Johannesburg factory was the largest blasting explosives factory in the world, with a standard of efficiency second to none. Owing to the present price of gold, millions of tons of low grade ore could now be worked profitably, and while these conditions prevailed the consumption of explosives would automatically increase. In Australia, good progress had been made with the erection of a new alkali works at Adelaide, and a new synthetic ammonia plant was being built. In India a new company had been promoted last March for the manufacture of alkalis in the Punjab and Bengal.

The Board had successfully adopted in Argentina, Australia and India a policy of enlisting the financial participation and support of local interests.

Lord McGowan stressed the need for a greater volume of total international trade and in particular an increase in British exports. He made two suggestions. First that a bolder course might be pursued on export credit guarantees. Secondly, that more use should be made of the British purchasing power that was evidenced by the large excess of imports over exports into the United Kingdom. He thought the Government's work in this direction would be greatly helped if we had better statistics of invisible exports than those at present available. "The Government alone can collect and obtain such figures," said Lord McGowan, "and I should welcome steps in that direction." It was also essential to watch the price and cost structure at home. British goods could not be sold in competition overseas if they were too costly.

The chairman reported that the net income of £7,061,000 was less than last year, but must be regarded as satisfactory in view of the fall in volume of trade, higher costs, a higher



Lord McGowan,
Chairman of
Imperial Chem-
ical Industries,
Ltd.

wage level, dearer raw materials and the difficulties of the international situation. The General Reserve had this year been brought to a total of £12,000,000 and the total dividend for the year was 8 per cent. As he had said last year, the aim of the Board was to maintain a steady dividend policy lying within narrow limits through good and bad years alike. To do this it would be necessary to build up from undistributed profits a reserve to cover the dividend in bad years.

Lord McGowan announced the Board's intention to establish a Central Laboratory. This would deal with work not covered by the I.C.I. manufacturing groups, which at present have separate laboratories, and would include long distance research.

During the past year international collaboration in research had been extended wherever possible, and the close relation of I.C.I. with E.I. du Pont de Nemours in the U.S.A. had given them the opportunity of acquiring the British Empire rights—excluding Canada—for the new synthetic material, Nylon. This material, when drawn into fine filaments, was closer in actual chemical structure to real silk than any other material yet made, and was stronger and more elastic than real silk. Although Nylon could be worked up into bristles, racquet strings, fishing lines and as a plastic, its principal uses were in the textile industry and for this reason the company had entered into negotiations with Courtaulds, Ltd., for the formation of a joint company to carry out the manufacture of Nylon yarn and fibres in the United Kingdom.

Relations with organised labour continued to be happy, and Lord McGowan emphasised the fact that the company was as much concerned as the Trade Unions to ensure the loyalty of members of the various unions to their own authorities.

Prospects for 1939

Prospects would depend to some extent on the United States, but still more on world political conditions for the forecast of which the industrialist could not be held responsible. Government expenditure on the defence programme would certainly be very much larger in 1939 than in 1938, but the resulting stimulus to trade activity would be of a scattered rather than a general nature and I.C.I. could not look for any abnormal effect. "Despite the anxieties attending the present political position," said Lord McGowan, "there is a remarkable level of business confidence in the country as a whole which augurs well for general business." So far the board were well satisfied with the volume of trade done. The more active the Government showed themselves in leading the new spirit that inspired the nation, the stronger the confidence would grow and with it the probability of a year that would prove satisfactory to stockholders of I.C.I. and enable the Board to pursue the policies they had approved.

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RECENT TRADE LITERATURE

THE DRAYTON REGULATOR AND INSTRUMENT CO., LTD., have issued a leaflet describing and illustrating some of their products. These include the "AM" and "EM" automatic temperature regulator, regulators for fine control and the "RV" Simplex pressure regulator.

HEAD, WRIGHTSON AND CO., LTD., have issued a folder illustrating examples of their cast steel manufacture. These include a "HedWrit" cast steel spur rim, a "HedWrit" cast steel shute weighing twelve tons, a "HedWrit" cast steel trunnion end, "HedWrit" cast steel hammer standards and molybdenum cast steel spindles for rolling mill machinery.

A booklet issued by ROBERT JENKINS AND CO., LTD., in connection with their A.R.P. apparatus, contains details of emergency water tanks which are designed to fit on the average medium-size lorry and have a capacity of 600 gallons. A pipe lying round the sides of the tank has a number of small cocks attached to it so that several buckets can be filled with water from the tank at the same time. When water is required for fire-fighting purposes, the pipe can be rapidly released from the tank leaving the tank with a standard quick-fastening fire hose connection available for coupling up to a pressure pump.

A towel service for industrial use is explained in a pamphlet recently issued by HARCRAFT, LTD. Section 42 of the Factory Act, Part Three, stipulates that adequate facilities for washing, including soap and clean towels, should be provided for employees, and it is in this connection that the Harcraft towel service is claimed to prove invaluable. The towels are installed in a cabinet which holds 470 at one filling. They are dispensed singly by a controlled delivery mechanism. From the hygienic standpoint it is notable that the only towel the user can touch is the one that he or she withdraws from the cabinet. The towels are of paper composition.

In "Bottle Washing," a handbook published by IMPERIAL CHEMICAL INDUSTRIES, LTD., the subject is systematically treated in three main sections, dealing respectively with the various types of bottles and their residues, bottle-washing machinery and the detergent. Photographs of cultures made from typical residues in returned beer bottles illustrate the types of organisms which must be removed and killed in the washing process. Emphasis is laid on the necessity for a detergent of high alkali content to neutralise the acid effects of certain residues, and to ensure the complete removal without pulping, of paper labels. The importance of high alkalinity, more particularly of the caustic or "hydroxide" kind, is similarly stressed in the practical section dealing with the washing of milk bottles, which for many reasons are more difficult to cleanse and sterilise than any other type. This section also contains useful notes on standards of bacteriological cleanliness as applied to bottles, and on the methods of dealing with grossly contaminated bottles and jars. The working of the various types of bottle-washing machines is described with special reference to lubrication and scale prevention, both of which depend on the composition of the detergent. Here again the importance of a detergent of high caustic soda content is stressed. Useful general directions are given regarding detergent concentrations and working temperatures in the different types of machine. The more specialised and detailed section on detergents deals with the newer alkaline mixtures from the standpoints of cleaning, bactericidal and scale-preventing properties. Of all alkalies, caustic soda is not only the most generally efficient cleanser but also the most powerful bactericide. By taking advantage of the special properties of such substances as sodium hexametaphosphate, it is now possible to incorporate very high proportions of caustic soda in bottle-washing detergents without any sacrifice of free rinsing and without risk of scale formation in the machine. The booklet gives

(Continued on foot of next column.)

PERSONAL NOTES

MR. G. GRIFFITH, assistant agricultural chemist in Uganda of the Colonial Agricultural Service, has been appointed to Malaya as chemist (soils).

MR. J. W. KNIGHT has been appointed Director of Imported Oils, Fats and Oilseeds under the Food (Defence Plans) Department's plan for the control of oils and fats in time of war.

DR. K. N. MATHUR, DR. R. K. SCHOFIELD, MR. W. C. PARKINSON, MR. G. N. PEEL, and DR. K. WEISSENBERG were elected Fellows of the Institute of Physics at a meeting of the Board of the Institute last week.

MR. ROBERT STEAD LITTLE, who on January 11 attempted to rescue a man who had fallen into a chemical reaction pan at the works of the British Dyestuffs Corporation, Blackley, Manchester, has been awarded the Edward Medal by the King in recognition of his gallantry.

MR. F. ALLSOP, assistant chemical sales manager to Staveley Coal and Iron Co., Ltd., was made a presentation on behalf of colleagues at the general offices, Staveley works, by Mr. A. Bradbury, chemical sales manager, on leaving to take up an appointment in London.

LORD EUSTACE PERCY was elected president of the Royal Institution at the anniversary meeting of members last week. SIR ROBERT ROBERTSON was elected treasurer, and among those who were elected managers were DR. F. H. CARR, PROFESSOR F. G. DONNAN and DR. J. J. FOX.

SIR PERCY ASHLEY, secretary to the Import Duties Advisory Committee, has been appointed a member of the committee in succession to Sir Allan Powell, MR. H. J. HUTCHINSON being appointed secretary in Sir Percy's place. Sir Sydney Chapman will also shortly retire from membership of the committee and his place will be taken by SIR DONALD BANKS.

PROFESSOR ALEXANDER FINDLAY, who occupies the Chair of Chemistry at Aberdeen University, has intimated his intention of retiring as from September 30, 1940. A graduate of Aberdeen, Professor Findlay occupied the Chair of Chemistry at the University College of Wales, Aberystwyth, for eight years prior to his appointment to Aberdeen in 1919.

OBITUARY

MR. KENNETH D. MACKENZIE, who had been associated for over 40 years with the firm of Frederick Braby and Co., Ltd., died on Monday. He was a director of the firm for 25 years, and for the same number of years he occupied the post of general manager of the firm's Eclipse works, Glasgow, and also of its other Scottish branches at Falkirk and Motherwell. Mr. MacKenzie was a member of the British Iron and Steel Federation.

SIR LOUIS W. SMITH, M.P., a director of Fison, Packard and Prentice, Ltd., chairman of Doughty-Richardson Fertilisers, Ltd., and a director of a number of other companies, has left estate valued at £96,155 (net personalty £80,518).

(Continued from preceding column.)

the results of authoritative experiments on the bactericidal efficiencies of various alkalies. Specific directions for choosing between the two I.C.I. alkali detergents according to the type of bottle-washing establishment and the nature of the water supply, and a table showing concentrations recommended for use in the various machines, complete a valuable handbook.

General News

ROBERT FRIEDLANDER (GREAT BRITAIN), LTD., manufacturers of printed soap novelties, are to occupy one of the factories now nearing completion at the Lankashire Industrial Estate at Larkall.

THE BUSINESS OF STEPHEN McDOWELL AND SON, chemical manufacturers, etc., Belfast, has been amalgamated with the Kilwaughter Lime Co., Larne. It is being carried on under the title of the Kilwaughter Chemical Co., Ltd.

DURING LAST MONTH stocks of shellac in London increased by 1,233 packages to 97,790 packages, the total a year ago being 128,976 packages. Landings in April numbered 8,525 packages, while deliveries from store amounted to 7,292 packages.

MILLCLOSE LEAD MINE at Darley Dale, Matlock, may close in two or three months unless a new vein is found. The mine, which is the largest of its kind in Britain and produces one-third of the total output of lead, has been worked for 100 years.

IMPERIAL CHEMICAL INDUSTRIES, LTD., announce that neither they nor the Salt Union, Ltd. (a subsidiary of I.C.I., Ltd.), have any connection whatever with Salt Union (Eire), Ltd., a company which was incorporated in the Irish Free State on April 26.

MANCHESTER CORPORATION RIVERS COMMITTEE has given permission for Dr. E. Arden, F.I.C., consulting chemist, to visit the United States in company with representatives of the Colne Valley Sewerage Board to study modern methods of sludge disposal.

THE INTERNATIONAL TIN RESEARCH AND DEVELOPMENT COUNCIL in consultation with the Lead Industries Development Council has prepared and issued a booklet entitled "Notes on Soldering of Lead Pipes and Sheet Metals," with a view to helping those who wish to make better soldered joints.

NEW WORKS.—The British Stainless Steel Co., Ltd., are to erect a new works in Darlington; Renton and Co., Ltd., bakelite moulders, London, N.2, are to erect a factory at Brentford, Middlesex, and a new factory at Bootle, Lancashire, is to be built by The Evergloss Polish Co., Ltd., Bootle.

THE NEW RAYON AND SILK ASSOCIATION, which replaces the Silk Association of Great Britain, was incorporated at Grosvenor House yesterday (Friday) morning, the first annual dinner being held the same evening. All the rayon producers in the country including British Celanese and Courtaulds are members of the Association, to which Queen Mary has consented to be patron.

PERMISSION HAS BEEN GRANTED to Oswald McCardell and Co., Ltd., laundry suppliers of Moss Park Road, Stretford, to discharge effluent from a proposed soap works at Reddish into the sewers of the Manchester Corporation. It is understood the firm has not yet selected a site for this works, but Reddish is one of three places in the Manchester district from which a choice will be made.

THE CEMENT MAKERS' FEDERATION announced on Monday that there will be no advance in the prices of cement so long as the cost of manufacture is not increased. To enforce this policy the Federation also gives notice that in the event of any of their merchants charging prices for cement higher than the current authorised price in any locality, notice to terminate agreement with such merchants will be given forthwith.

WHEN FIRE BROKE OUT at the works of British Tar Products at Cadishead, near Irlam, Lancashire, last week, vats containing crude naphthalene, creosote and other tar products were set alight. A 5,000-gallon benzole railway tank, standing in a private siding, exploded and another caught fire. Nobody was seriously injured. Irlam fire brigade and the company's private brigade saved large stores of naphthalene and benzole and prevented the flames reaching a naphthalene plant and a benzole plant.

THE HILLINGTON INDUSTRIES FAIR is to be held at the Scottish Industrial Estate, Hillington, Glasgow, from June 13 to 15. More than 50 manufacturers whose works are situated on the estate will take part in the exhibition, which is the first of its kind to be held by an industrial estate in Britain. It is hoped to make it an annual event. The fair has been planned to give buyers all over the country an opportunity to see the large variety of products manufactured on the estate, and also to show manufacturers the factory facilities that are available.

From Week to Week

THE ZINC DEVELOPMENT ASSOCIATION was registered last week as a company limited by guarantee without share capital. Following an application to the Board of Trade the word "Limited" is omitted from the title by licence. The objects of the Association are to acquire the assets, liabilities and business of the Zinc Development Association, Ltd., and to promote the increase in the consumption of zinc, etc.

Foreign News

THE YIELD OF OPIUM from last year's poppy harvest in Bulgaria was 4.5 tons as compared with 5.4 tons in 1937.

TWO RECENTLY FORMED CANNING FACTORIES in Greece have under consideration the extraction of oil from tomato seeds.

COURTAULDS, LTD., have settled their £5,000,000 taxation case in the United States and have agreed to pay £600,000 additional taxes.

THE GUMMIVARE-FABRIKKEN JYLLAND A.S. has been established with a capital of 500,000 kroner at Horsens (Denmark) and will engage in the manufacture of rubber products.

MOLYBDENUM ORE DEPOSITS discovered in the Vosges region of France are to be exploited by a subsidiary of the Mirabaud concern recently formed under the style of Syndicat Chateau-Lambert.

EXPORTS OF CALCIUM CHLORIDE from Belgium increased from 72,896 metric tons in 1937, to 78,431 tons last year, the outstanding market being Sweden which country has now undertaken calcium chloride manufacture itself.

A NEW PROCESS FOR THE PREPARATION OF PIPERYLENE discovered by the Russian workers, Lemke and Tichtchenko, involves high-temperature treatment of the vapours of dichloropentane or monochloropentene. Piperylene (or pentadiene-1, 3) has been put forward as a raw material for synthetic rubber manufacture.

ACCORDING TO FIGURES issued by the U.S. Securities Exchange Commission, America's highest salaried business men in 1938 included Mr. Robert Stanley, chairman of the International Nickel Co., with an income of £43,000; Mr. Seton Porter, president of National Distillers, £36,000; Mr. Frank Lovejoy, president of the Eastman Kodak Co., £23,000; and Mr. Louis Liggett, president of the United Drug Co., £14,000.

THOUGH FINLAND'S DOMESTIC INDUSTRY in medicinals and pharmaceuticals is still in its infancy reports indicate that it is growing steadily. No foreign capital is apparently interested in the country's domestic medicinal manufacturing industry, but a tendency for a number of firms to import in bulk for repackaging and sale under local trade names appears to be on the increase. Germany obtains from 40 to 50 per cent. of Finland's import business in medicinals and pharmaceuticals, due to the proximity of the market and other factors, which enable German manufacturers to give close attention to Finnish requirements.

A REPORT FROM PEKING states that eighty-five Chinese and eleven Japanese match factories have joined the "National Match Corporation," which has just been formed in Tientsin. This Corporation is to be the sole controlling organisation for the sale of matches in all areas under the jurisdiction of the Provisional and Reformed Governments in China. While its head office will be in the Japanese Concession in Tientsin, the Corporation will also have branches in Peking, Shanghai and other big cities. Match factories which are members of the Corporation will be prohibited from doing business separately and all prices will be standardised.

A GERMAN ORDER which came into force on Monday, forbids the use of motor spirit in its present constitution except in the North German regions. In all other parts of Germany, motor benzine is to be sold only as an admixture of benzene and lead tetraethyl, added in sufficient proportion to secure requisite detonation characteristics. A new kind of motor spirit for the whole Reich, it is stated, will shortly become available; this, in quality, will be similar to the present so-called "benzene-benzole-mixture." In addition, a high alcohol concentration fuel is likely to become available. These measures are introduced, it is stated, to safeguard economic utilisation of supplies.

A NEW MOTOR SPIRIT composed of 90 per cent. alcohol and 10 per cent. natural gas is being marketed in Poland under the name of "Algaz."

I, 3-BIS-PHENYLAMINOPROPANE is a derivative of diaminopropane of value as an antioxidant for rubber and has recently been obtained in the pure state by W. L. C. Veer (*Rec. Trav. Chim. Pays-Bas*, 57, 989.)

THE GREEK WINE AND ALCOHOL CO., is planning to expand its present output of 1,000 tons of carbon disulphide to 1,800 tons per annum with a view to developing an export trade to neighbouring countries. It is also proposed to embark in the coming year upon the production of formaldehyde and methanol.

THE REPORT OF THE SNIA VISCOSA of Milan describes the progress made in 1938 in the production of cellulose from the Italian reed (*arundo donar*). About 15,000 acres were planted with the reed in 1938 and the anticipated yield per acre is 6 tons cellulose or 5 tons artificial fibre. The annual output capacity of the cellulose-producing factories at Torre di Zuino is 30,000 tons.

THE PITCHBLEND MINES owned by the German Government at Joachimsthal in the Sudeten region have been leased by the Auergesellschaft, a branch of the Frankfurter Scheideanstalt concern, who propose shipping the pitchblende to their Berlin plant where the radium will be recovered. The old works at Joachimsthal, which previously worked the output of the mines, will be dismantled.

ATTEMPTS ARE BEING MADE to expand the French output of sulphur from the extensive deposits at Malvézy (Department of Aude). Extending over an area of about 1,700 acres and with a thickness in parts of 120 feet, the deposits are expected to yield a minimum of 7,000 tons per annum. Other important sulphur deposits are worked at Apt where 5,000 tons were obtained in the past year.

THE DOMESTIC BAUXITE INDUSTRY in the U.S.A. experienced a marked reduction in business in 1938, according to the Bureau of Mines, United States Department of the Interior. Production declined 26 per cent., shipments to the aluminium, chemical and abrasive industries all showing substantial declines. In 1938 imports and exports of bauxite decreased 10 per cent., and 53 per cent. respectively.

USEFUL CATALYSTS FOR HYDROGENATION of organic compounds under pressure have been prepared from alloys of nickel, cobalt and aluminium by eliminating the aluminium with a 20-25 per cent. soda solution. The resulting porous masses have proved effective in the reduction of aldehydes to primary alcohols and of nitro compounds to amines. (I. Rapoport and B. Rapoport, *J. Prikl. Khim.*, 11, 723.)

AT THE RECENT FOURTH ANNUAL CONFERENCE of the Palestine Chemists' Association, held at Tel Aviv, twenty-nine lectures were delivered, the problems discussed relating to the pharmaceutical industry, chemical processes in the manufacture of textiles, and chemistry in connection with dairy farming and orange growing. An unusually large proportion of research chemists are at work in Palestine, in addition to pharmaceutical chemists. There are four branches of the Chemists' Association at Tel Aviv, Jerusalem, Haifa and Rehovoth.

THE CHEMISCHE FABRIK JOHANN BENCKISER in French Patent 827,687, describe the treatment of animal blood with sodium citrate or sodium pyrophosphate. This treatment slows down coagulation and so allows the blood to be subjected to various chemical or physical treatments for further use. It is suggested that the blood can be separated into red corpuscles and serum by filtration or centrifugal separation, and the filtrate, containing the fibrine, used in the same way as either egg-white or gelatine. Dried *in vacuo*, the serum can be used for the manufacture of glue.

THE UNUSUAL PROBLEM of separating three valuable products, fluorspar, lead and zinc, from a single ore by flotation has been solved, and details of the process have just been published by the Bureau of Mines, United States Department of the Interior, as Report of Investigations 3437. The aim was to produce lead concentrates relatively free from zinc and fluorspar, zinc concentrates containing less than 1 per cent. of fluorspar and moderately free of lead and fluorspar concentrates practically free of sulphides and containing at least 98 per cent. of fluorspar. Conditions were established under which selective flotation produced the desired results. Quebracho, a crude tannin extract, was found to be very effective in the separation of fluorspar from sulphides, calcite, and siliceous minerals.

Company News

Manbré and Garton, Ltd., have declared an interim dividend of 5 per cent., less tax (1 per cent.).

Boots Pure Drug Co., Ltd., report net profits for the year to March 31 of £776,292 (£762,625). A bonus of 5 per cent., tax free, has been declared.

Newton, Chambers and Co., Ltd., report a profit for 1938 of £117,394 (£105,708); to capital sinking fund reserve £25,000 (the same); forward, £106,664 (£80,925).

Tomaszow Artificial Silk Works, Ltd., Warsaw, report profits for 1938 of £188,397 (£148,548). Transfer to statutory and other reserve is £40,054 (£41,568). A dividend of 10 per cent. has been declared.

Stewarts and Lloyds, Ltd., report gross profits for the year to December 31 of £2,649,791 (£2,506,882). After deducting debenture interest, fees and staff fund, and providing £50,000 more at £600,000 for tax and N.D.C., net profits work out at £1,331,234 (£1,379,314).

Wiggins Teape & Co. (1919), Ltd., have declared a final dividend of five per cent., plus a bonus of two per cent., bringing the total distribution for 1938 to 10 per cent. (the same). Net profits for the year, before charging debenture interest, work out at £394,313 (£453,691).

J. Lyons and Co., Ltd., have maintained the final dividend on the ordinary and "A" ordinary shares of the company at 14½ per cent., making 22½ per cent., less tax, for the year to March 31 last (the same). The trading account balance amounted to £1,011,980 (£1,011,000).

Beechams Pills, Ltd., report a rise in trading profits of £122,755 to £732,663 for the year to March 31. A final dividend of 16 per cent., less tax, is recommended on 2s. 6d. deferred shares. Tax and N.D.C. take £190,792 (£151,926); to reserve for development, £72,919 (£86,584); carry forward, £84,484 (£81,966).

International Nickel Co. of Canada report a net profit of \$9,547,300, equivalent to 62 cents per share on the common stock after allowing for preferred dividend, for the first three months of 1939. This compares with \$8,115,096, or 53c. per share for the last quarter of 1938 and with \$10,113,765, or 66c. per share, for the first quarter of last year.

Reckitt and Colman, Ltd., who were incorporated last year to acquire the trading assets of Reckitt and Sons and J. and J. Colman, have declared an initial dividend of 5½ per cent., less tax. Trading profits for the year, including subsidiaries, results for their last financial year, and after providing for depreciation and all working and management expenses, amount to £1,580,149.

Imperial Chemical Industries, Ltd.—The directors of the Company have decided to proceed with the purchase of all the shares in the Magadi Soda Co. so far offered to them for sale as the result of their recent offer. In due course the I.C.I. board intend to confer with the Magadi directors on proposals for the financial reconstruction of the Magadi Company. In the opinion of Imperial Chemical Industries, as the controlling shareholder, it seems most probable that this reconstruction will involve calling up the outstanding 2s. on each preferred ordinary share and also unlikely that it will be possible in the reconstruction to attach as much value to either the second preference shares or the preferred ordinary shares (when fully paid) as the value represented by the offers of purchase already made by the I.C.I. board.

Books Received

Das Chemische Feuerlöschwesen. By Dr. Oskar Kausch. Leipzig: Verlag Von S. Hirzel. Pp. 283. RM. 18.50.

The Chemistry of Milk. By W. L. Davies. 2nd edition. London: Chapman and Hall, Ltd. Pp. 534. 25s.

Annual Reports on the Progress of Chemistry. Vol. XXXV, 1938. London: The Chemical Society. Pp. 447. 13s.

Qualitative Organic Chemistry. By Neil Campbell. London: Macmillan and Co., Ltd. Pp. 213. 8s. 6d.

Lehrbuch für das Anorganisch-Chemische Praktikum. By Wilhelm Jander. Leipzig: Verlag Von S. Hirzel. Pp. 415. 8RM.

Physical Constants of Hydrocarbons. Vol. 1. Gustav Egloff. New York: Reinhold Publishing Corporation. London: Chapman and Hall, Ltd. Pp. 403. 45s.

Electrochemistry of Gases and Other Dielectrics. By G. Glockler and S. C. Lind. New York: John Wiley and Sons, Inc. London: Chapman and Hall, Ltd. Pp. 469. 30s.

Casein and its Industrial Applications. By E. Sutermeister and F. L. Browne. 2nd edn. New York: Reinhold Publishing Corporation. London: Chapman and Hall, Ltd. Pp. 433. 32s. 6d.

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Applications for Patents

PRODUCTION OF ARTIFICIAL RESIN, ETC.—L. Bolgar. 12444.
 RESINOUS COMPOSITIONS, ETC.—British Thomson-Houston Co., Ltd. (United States, April 27, '38.) 12414.
 PRODUCTION OF STEEL, ETC.—F. H. Clark, and R. F. Dirkes. (United States, April 30, '38.) 12273; (United States, Aug. 20, '38.) 12274.
 PRODUCTION OF HYDROCARBONS.—C. Cockram, and Imperial Chemical Industries, Ltd. 12292.
 DETERGENTS.—Colgate-Palmolive Peet Co. (United States, April 22, '38.) 12056; (United States, Oct. 21, '38.) 12057.
 HORTICULTURAL FUNGICIDAL COMPOSITIONS.—B. Collie, and Imperial Chemical Industries, Ltd. 11937.
 PREPARATION OF FINELY COMMUNITED OXIDES.—Corning Glass Works. (United States, May 14, '38.) 12059.
 COATING COMPOSITIONS.—A. Duerden, and Imperial Chemical Industries, Ltd. 12293.
 MANUFACTURE OF POLYHYDRIC ACIDS.—E. I. du Pont de Nemours and Co. (United States, April 21, '38.) 12089.
 MANUFACTURE OF BENZIDINE.—E. I. du Pont de Nemours and Co. (United States, April 23, '38.) 12295.
 PLASTICISING RUBBER SUBSTITUTES.—E. I. du Pont de Nemours and Co. (United States, April 26, '38.) 12303; (United States, July 23, '38.) 12304; (United States, March 28, '38.) 12305, 12306.
 MANUFACTURE OF CARBOXYLIC ACIDS.—E. I. du Pont de Nemours and Co. (United States, April 25, '38.) 12438.
 SULPHUR POLYMERISED CHLOROPRENE.—E. I. du Pont de Nemours and Co. (United States, April 26, '38.) 12448; (United States, June 29, '38.) 12449.
 PRODUCTION OF LIQUID NITROGEN TETROXIDE.—E. I. du Pont de Nemours and Co. (United States, April 30, '38.) 12549.
 CLEANSING, ETC., COMPOSITIONS.—E. I. du Pont de Nemours and Co., and J. K. Hunt. 11936.
 CELLULOSE DERIVATIVE EMULSIONS.—E. I. du Pont de Nemours and Co., A. Dreyling, and W. W. Lewers. 12550.
 PRODUCTION OF READILY SOLUBLE CALCIUM SALTS.—J. G. Fife (Wülfig and Roskothien). 12088.
 MANUFACTURE, ETC., OF SYNTHETIC RUBBER-LIKE MATERIALS.—H. Gudgeon, B. J. Habgood, R. Hill and Imperial Chemical Industries, Ltd. 12436.
 MANUFACTURE OF BACTERIAL ANTIGENIC, ETC., PREPARATIONS.—W. N. Haworth, M. Stacey, B. A. Hems, F. A. Robinson, and Glaxo Laboratories, Ltd. 11939.
 LACQUER COMPOSITIONS containing solution of chlorine-containing rubber.—Hercules Powder Co. (United States, Oct. 12, '38.) 12168.
 PRODUCTION OF HYDROCARBONS.—R. Holroyd, D. H. P. Peel, and Imperial Chemical Industries, Ltd. 11938, 12294.
 REMOVAL OF SILICA from aluminosilicates, etc.—I. G. Farbenindustrie. (Germany, June 8, '38.) 12113; (April 21, '39.) (Germany, April 5, '39.) 12567.
 ZINC BASE ALLOYS.—Imperial Chemical Industries, Ltd. (United States, April 23, '38.) 12090.
 MANUFACTURE OF SOAP PRODUCTS.—Imperial Chemical Industries, Ltd. (United States, April 22, '38.) 12296.
 PRODUCTION OF BUTADIENE.—G. W. Johnson (I. G. Farbenindustrie.) 12265.
 CELLULOSIC COMPOSITIONS, ETC.—Kodak, Ltd. (United States, April 26, '38.) 12482.
 MEANS FOR PRODUCING CARBON DIOXIDE SNOW.—R. Kurth. 11960.
 SOLUTIONS OF RUBBER COMPOSITIONS.—Manchester Oxide Co., Ltd., J. H. Clayton, and B. Bann. 12218.
 POLYMERISATION OF UNSATURATED HYDROCARBONS.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. (United States, May 16, '38.) 11952.
 PREPARATION OF SATURATED HYDROCARBONS, ETC.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. (Netherlands, May 21, '38.) 12313.
 COMPOUND OF IODINE.—W. Nicholas. 12390.
 PREPARATION OF ARTIFICIAL SILK, ETC., from soya bean casein.—E. Potter. (Nov. 26, '37.) 12256.
 PREPARATION OF EMULSIONS.—L. N. Reddie (Girdler Corporation). 12120.
 MANUFACTURE OF VITAMIN K.—Roche Products, Ltd. (Denmark, May 11, '38.) 11929.
 MANUFACTURE OF DERIVATIVES OF UNSATURATED HYDROCARBON CHLORIDES of increased molecular weight.—Röhm and Haas Ges. (Germany, April 27, '38.) 12532.
 RECLAMATION OF WASTE RUBBER.—Rubber Improvement, Ltd., J. Lewis, and S. C. Lewis. 12183.
 MANUFACTURE OF CARBOXYLIC ACIDS of the cyclopentanopolyhydrophenanthrene series.—Schering, A.-G. (Germany, April 21, '38.) 11943; (Germany, July 1, '38.) 11944; (Germany, Dec. 8, '38.) 11945, 11946; (Germany, April 3.) 11947.
 MANUFACTURE OF OIL SOLUTIONS OF HORMONES.—Schering, A.-G. (Germany, April 21, '38.) 11948.

WATERPROOF CELLULOSIC PELLICLES, ETC.—Sylvania Industrial Corporation. (United States, May 14, '38.) 12384.
 PRODUCTION OF POLYAZO DYES.—M. Szpilfogel. 12460.
 POLYVINYL PHTHALATES, ETC.—H. J. Tattersall, and Imperial Chemical Industries, Ltd. 12091.
 METHOD OF INCREASING THE YIELD IN HYDROCARBON, ETC.—A. A. Thornton (Gelsenkirchener Bergwerks, A.-G.). 11911.
 PROCESS, ETC., FOR CONTINUALLY CRYSTALLISING SUGAR, ETC.—N. V. Werkspoor. (Germany, May 9, '38.) 12412.
 COMMERCIAL PRODUCTION OF DELBRÜCK'S BACILLUS, ETC.—G. Boringhieri. (Italy, April 28, '38.) 12619.
 RESINOUS COMPOSITIONS.—British Thomson-Houston Co., Ltd. (United States, April 29, '38.) 12768.
 PLASTIC COMPOSITIONS.—R. W. Carter. 12676.
 PRODUCTION OF AMINO ACIDS.—Corn Products Refining Co. (United States, June 20, '38.) 12832, 12834.
 PRODUCTION OF ZEIN.—Corn Products Refining Co. (United States, May 5, '38.) 13026; (United States, July 15, '38.) 13027.
 MANUFACTURE OF STARCH.—Corn Products Refining Co. (United States, July 11, '38.) 13028.
 PRODUCTION OF DEXTROSE.—Corn Products Refining Co. (United States, May 19, '38.) 13029.
 PRODUCTION OF COMPOSITIONS comprising zein.—Corn Products Refining Co. (United States, June 23, '38.) 13184.
 MANUFACTURE OF SUPERPHOSPHATE FERTILISERS.—Davison Chemical Corporation. (United States, June 15, '38.) 13129.
 PLASTIC COMPOSITION.—F. G. Denton. 13112.
 PROCESS FOR THE THERMAL DECOMPOSITION OF FOSSIL FUELS.—Deutsche Gold- und Silber Scheideanstalt vorm. Roessler. (Germany, April 30, '38.) 13002.
 DISPERSIONS OF RUBBER.—Dewey and Almy, Ltd. (Dewey and Almy Chemical Co.). 13131.
 INSECTICIDAL COMPOSITIONS.—E. I. du Pont de Nemours and Co. (United States, April 28, '38.) 12802.
 MANUFACTURE OF DIHALOGENOBUTANES.—E. I. du Pont de Nemours and Co. (United States, May 2, '38.) 13128.
 MANUFACTURE OF SULPHUR-CONTAINING ORGANIC COMPOUNDS.—S. Ellingworth, F. L. Rose, and Imperial Chemical Industries, Ltd. 13248.
 MANUFACTURE OF HALOGENATED HYDROCARBONS.—L. A. Elson, H. C. Lumsden, and Imperial Chemical Industries, Ltd. 13249.
 PRODUCTION OF TOLUENE.—Gas Light and Coke Co., and R. H. Griffith. 12968.
 INSECTICIDES.—General Chemical Co. (United States, May 4, '38.) 13177.
 CERAMIC MATERIALS, ETC.—General Electric Co., Ltd., J. R. Lait, and J. H. Partridge. 12992.
 PRODUCTION OF GAS MIXTURE for synthetic purposes.—F. Hansgirt. (Japan, May 13, '38.) 12667.
 COPPER ALLOYS, ETC.—Hirsch Kupfer- und Messingwerke, A.-G. and Kupferwerk Isenburg, A.-G. (Germany, June 24, '38.) 13251.
 MANUFACTURE OF PHOSPHORIC ACID DICHLORIDES of 4-amino benzene sulphonamides.—F. Hoffman-La Roche and Co., A.-G. (Germany, May 16, '38.) 12620.
 MANUFACTURE OF CONDENSATION PRODUCTS from halogen derivatives of phytol.—F. Hoffman-La Roche and Co., A.-G. (Switzerland, April 29, '38.) 12621.
 MANUFACTURE OF OPTICALLY ACTIVE MENTHONES, ETC.—Howards and Sons, Ltd., J. W. Blagden, and W. E. Huggett. 13206.
 ELIQUATION OF ZINC from dust containing zinc.—Hüttenwerke Siegerland, A.-G. (Germany, June 22, '38.) 12763.
 MANUFACTURE OF ACID AMIDES.—I. G. Farbenindustrie. (Germany, April 28, '38.) 12662; (Germany, Nov. 5, '38.) 12663; (Germany, Nov. 7, '38.) 12664.

Complete Specifications Open to Public Inspection

PROCESS FOR DESULPHURISING IRON or iron alloys.—Sachtleben, A.-G. für Bergbau und Chemische Industrie. Oct. 29, 1937. 19768/38.
 MANUFACTURE OF AZO-DYESTUFFS.—I. G. Farbenindustrie. Oct. 25, 1937. 27637/38.
 PRODUCTION OF AMINES from esters of amino-alcohols.—T. H. Temmler (trading as Temmler-Werke Vereinigte Chemische Fabriken H. Temmler). Oct. 30, 1937. 28656/38.
 MANUFACTURE OF ALIPHATIC ETHERS.—Usines de Melle. Oct. 27, 1937. 28803/38.
 PROCESS FOR POLYMERISING VINYL ESTERS.—Carbide and Carbon Chemicals Corporation. Oct. 29, 1937. 29073/38.
 PROCESS FOR THE SEPARATION OF THE COMPONENT PARTS OF ALLOYS OR MIXTURES OF METALS.—P. Kemp. Oct. 25, 1937. 29593/38.
 ACTIVATION OF SILVER CATALYSTS.—Carbide and Carbon Chemicals Corporation. Oct. 30, 1937. 29757/38.
 PROCESS FOR REMOVING WEAKLY ACID COMPONENTS from hydrocarbons or derivatives thereof.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Nov. 1, 1937. 29914/38.
 ALUMINIUM ALLOYS.—H. Mahie. Oct. 29, 1937. 30107/38.

MANUFACTURE OF CARBONYL COMPOUNDS of the cyclopentanopolyhydrophenanthrene series.—Soc. of Chemical Industry in Basle. Oct. 25, 1937. 30353/38.

MANUFACTURE OF NITROGENOUS CONDENSATION PRODUCTS, and a process of improving textiles.—I. G. Farbenindustrie. Oct. 28, 1937. 30356/38.

CHEMICAL COMPOSITION, and method of treating textiles.—British Celanese, Ltd. Oct. 26, 1937. 30381/38.

PROCESS FOR PREPARING A TRISUBSTITUTED BARBITURIC ACID.—E. De Haen Riedel, A.-G. Oct. 28, 1937. 30479/38.

MANUFACTURE OF UNSATURATED STEROID KETONES.—Soc. of Chemical Industry in Basle. Nov. 1, 1937. 30490/38.

PROCESS FOR THE MANUFACTURE OF TERTIARY ALCOHOLS of the octane series and their derivatives.—Schering, A.-G. Oct. 25, 1937. 30552/38.

PROCESS FOR THE MANUFACTURE OF A CHEMICAL ABSORBENT for carbon dioxide.—Auerger, A.-G. Oct. 25, 1937. 30752/38.

PRODUCTION OF HARDENED ARTIFICIAL RESIN PRODUCTS.—Albert Products, Ltd. Oct. 30, 1937. 30857/38.

MANUFACTURE OF ACID AZO-DYESTUFFS.—J. R. Geigy, A.-G. Oct. 27, 1937. 30958/38.

MANUFACTURE OF COMPOUNDS of the cyclopentanopolyhydrophenanthrene series.—Schering, A.-G. Oct. 27, 1937. 31013/38.

DYEING OF CELLULOSE DERIVATIVES and other highly polymerised compounds.—Soc. Rhodiacheta. Nov. 1, 1937. 31109/38.

METHOD OF PLASTICISING SYNTHETIC AND NATURAL RUBBER in dispersions.—Deutsche Dunlop Gummi Cie, A.-G. Oct. 27, 1937. 31118/38.

PROCESS FOR EXTRACTING SUGAR from molasses by dialysis.—Sylvania Industrial Corporation. Oct. 28, 1937. 31192/38.

PREPARATION OF DERIVATIVES OF *p*-AMINO BENZENESULPHONAMIDE.—Naamloze Vennootschap Orgachemia. Oct. 29, 1937. 31282/38.

OPENING-UP OF ZIRCONIUM ORES.—I. G. Farbenindustrie. Oct. 30, 1937. 31359/38.

MANUFACTURE AND PRODUCTION OF SYNTHETIC TANNING AGENTS.—I. G. Farbenindustrie. Oct. 30, 1937. 31450/38.

MANUFACTURE AND PRODUCTION OF SYNTHETIC TANNING AGENTS.—I. G. Farbenindustrie. Oct. 30, 1937. 31451/38.

PROCESS FOR THE MANUFACTURE OF *p*-*p'*-DIAMINO-DIPHENYL-SULPHONE and its monoamino derivatives.—Schering, A.-G. Nov. 1, 1937. 31511/38.

Specifications Accepted with Date of Application

PROCESS FOR THE MANUFACTURE OF AN ALDOL CONDENSATION PRODUCT from carbonyl compounds.—Naamloze Vennootschap de Bataafsche Petroleum Maatschappij. June 12, 1937. 504,337.

DYEING ARTIFICIAL SILK with acid dyes.—Soc. Anon. Industrie Chimiche Barzaghi. Aug. 3, 1936. 504,572.

MANUFACTURE OF CONDENSATION PRODUCTS containing nitrogen.—Soc. of Chemical Industry in Basle. Oct. 24, 1936. 504,562.

COAGULATION OF COLLOIDAL DISPERSIONS.—E. I. du Pont de Nemours and Co. Oct. 24, 1936. 504,467.

COAGULATION OF AQUEOUS DISPERSIONS OF POLYMERS of 2-halo-*geno*-1:3-butadiene.—E. I. du Pont de Nemours and Co. Oct. 24, 1936. 504,466.

STABILISING SOLUTIONS or suspensions of therapeutic substances. W. W. Groves (I. G. Farbenindustrie.) Oct. 26, 1937. 504,721.

SYNTHETIC RUBBER-LIKE MATERIALS.—G. E. Scharff, and Imperial Chemical Industries, Ltd. Oct. 26, 1937. 504,568.

MANUFACTURE OF BENZENE HEXACHLORIDE.—A. E. Grant, and Imperial Chemical Industries, Ltd. Oct. 26, 1937. 504,569.

CONCENTRATING NON-METALLIC MINERALS from ores containing silicious matter.—Phosphate Recovery Corporation. July 28, 1937. 504,395.

MANUFACTURE OF KETENES.—E. I. du Pont de Nemours and Co. Oct. 28, 1936. 504,626.

TREATMENT OF POLYMERISED ORGANIC COMPOUNDS.—Distillers Co., Ltd., H. P. Staudinger, and H. M. Hutchinson. Oct. 27, 1937. 504,571.

MANUFACTURE OF METHACRYLIC ACID ESTERS.—G. E. Wainwright, J. H. Brown, and Imperial Chemical Industries, Ltd. Oct. 28, 1937. 504,734.

MANUFACTURE OF AZO-DYESTUFFS.—I. G. Farbenindustrie. Nov. 4, 1936. 504,754.

MANUFACTURE AND PRODUCTION OF VAT DYESTUFFS of the dibenzanthrone series.—G. W. Johnson (I. G. Farbenindustrie.) Dec. 7, 1937. 504,478.

STABILISATION OF STYRENE.—Standard Telephones and Cables, Ltd., and S. G. Foord. Dec. 24, 1937. 504,765.

VULCANISATION OF RUBBER.—Wingfoot Corporation. June 19, 1937. 504,583.

SULPHONATED TERPENYL ALKYL PHENOLS.—American Cyanamid and Chemical Corporation. June 26, 1937. 504,417.

PRODUCTION OF BASIC CALCIUM HYPOCHLORITE.—I. G. Farbenindustrie. June 8, 1937. 504,776.

MANUFACTURE OF AZODYESTUFFS.—I. G. Farbenindustrie. May 18, 1937. 504,504.

VULCANISATION OF RUBBER.—Wingfoot Corporation. Sept. 24, 1937. 504,684.

PROCESS FOR THE MANUFACTURE OF CELLULOSE ETHERS.—Henkel and Cie, Ges. Aug. 31, 1937. 504,600.

HARD METAL ALLOYS.—H. Peterson. July 6, 1938. 504,522.

PRODUCING SYNTHETIC GAS BY GASIFICATION OF FUELS under elevated pressure.—Metallges, A.-G. Sept. 27, 1937. 504,529.

TREATMENT OF SPENT COBALT CATALYSTS.—Ruhrcemie, A.-G. Sept. 25, 1937. 504,700.

MAGNESIUM ALLOYS.—G. Von. Giesche's Erben. Sept. 21, 1937. 504,602.

HARD METAL ALLOYS.—F. Eisner. April 29, 1938. 504,543.

PRODUCTION OF MONOBASIC ALUMINIUM SULPHITE.—T. Goldschmidt, A.-G., and Vereinigte Aluminiumwerke, A.-G. Nov. 3, 1937. 504,704.

STABILISATION OF STYRENE.—Standard Telephones and Cables, Ltd., and S. G. Foord. Dec. 24, 1937. (Divided out of 504,765.) 504,780.

Chemical and Allied Stocks and Shares

THE better tendency which developed on the Stock Exchange last week has made further progress and movements in share prices were mostly in favour of holders. The further increase in steel production, lower unemployment figures, higher railway traffics and other indications of improving trade conditions created a good impression. The disposition is to take the view that the upward trend in trade activity is likely to continue as a result of the direct and indirect benefits of armament and kindred work.

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Securities of chemical and allied companies were mostly higher as a result of the surrounding tendency in the stock and share markets. Imperial Chemical are 30s. 4½d. at the time of writing, compared with 29s. 9d. a week ago, while the company's preference units have improved further from 28s. 9d. to 30s. Lever and Unilever showed a strong rally from 33s. 6d. to 35s. 6d., while many other shares with an international market also improved owing to a disposition to take the view that tension in European political conditions is easing. United Molasses moved up from 23s. to 24s. 7½d. pending declaration of the interim dividend. Babcock and Wilcox at 42s. have held last week's improvement, while Tube Investments at 86s. 9d. were little changed, although now "ex" the interim dividend.

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B. Laporte, which continued to be held tightly in view of the recent scrip bonus announcement, made the higher price of 87s. 6d. British Aluminium were good with an advance from 55s. 9d. to 57s. 3d., while British Oxygen were slightly higher at 76s. 10½d., and Turner and Newall were maintained at 75s. 9d., as were Murex at 72s. 6d. Dorman Long, United Steel and numerous other iron, steel and kindred securities showed moderate gains, including Stewarts and Lloyds, which were better at 41s. 4½d. under the influence of the full results. Stanton Iron-

works shares improved to 42s. 6d. on the market view that, despite the larger capital, the dividend is again likely to be maintained at 10 per cent., the rate which has ruled over a long period of years. Staveley Iron shares made the better price of 40s. 6d. Guest Keen ordinary also reflected the surrounding market tendency, and at 24s. 1½d. are slightly above the price current a week ago. The results of the latter company are expected to be issued early next month.

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Boots Pure Drug improved moderately and are 41s. 6d. xd. at the time of writing, while Beechams Pills deferred shares show a small rise from 7s. 1½d. to 7s. 7½d. Sangers were again 20s. 4½d. and British Drug Houses 21s. Timothy Whites and Taylors were a few pence higher at 23s. 7½d. on the past year's results and the company's capital proposals.

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Greeff-Chemicals Holdings ordinary units were little changed at 4s. xd. while British Match were steady at 32s. 9d. xd. on satisfaction with the past year's results. William Blythe & Co. ordinary shares continued to be quoted at 6s. and Blythe Colour works were again 7s. 6d., but Cellon were slightly lower at 14s. 6d. Wall Paper Manufacturers deferred units remained at the lower price of 27s. 6d., made last week. International Paint were a firm feature at 75s. Barry and Staines rallied from 29s. 6d. to 31s. 3d. Fison Packard and Prentice, which attracted rather more attention, have improved from 37s. 6d. to 38s. 9d. at the time of writing.

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Oil shares reflected the better trend of markets and Burmah Oil, V.O.C. and Lobitos were higher, awaiting the impending dividend announcements. On the other hand, Anglo-Iranian lost part of an earlier gain. Mexican Eagle Oil shares attracted attention on a revival of reports that the difficulties with the Mexican Government may be settled in the near future.

Weekly Prices of British Chemical Products

TRADE has been on a good scale in the general chemical market this week, the volume of inquiry both for home and export showing a decided improvement. So far as existing contracts are concerned consumers appear to be calling for prompt delivery. Values remain unchanged, there being no important price features to record for general chemicals, rubber chemicals and wood distillation products. Rather more active conditions are reported in the market for coal tar products with buyers seeking to cover their nearby requirements at the existing low rates. In one or two directions, however, holders of stocks are content to mark time and await a recovery in the price position.

MANCHESTER.—A fair number of traders on the Manchester chemical market during the past week have described conditions as reasonably satisfactory. One or two express disappointment at

the rate at which contract deliveries are being taken up, but this is not general. There is a fair call for the leading alkalis and certain of the heavy acids, whilst a moderately active movement of some of the industrial potash compounds is reported. A

quietly steady business has been transacted this week in near delivery parcels, and little further change in prices has occurred. Offers of tar products have been about maintained, with buying interest centred largely on certain of the light distillates, which are maintaining a steady tone.

GLASGOW.—Business in general chemicals has continued on a steady basis during the week, both for home trade and export, with no outstanding features. Prices generally continue very firm at about previous figures, with no important changes to report.

Price Changes

Rises: Copper Sulphate (Manchester)

General Chemicals

ACETONE.—£39 to £43 per ton, according to quantity.
ACETIC ACID.—Tech, 80%, £30 5s. per ton; pure 80%, £32 5s.; tech., 40%, £15 12s. 6d. to £18 12s. 6d.; tech., 60%, £23 10s. to £25 10s. MANCHESTER: 80%, commercial, £30 5s.; tech. glacial, £42 to £46.
ALUM.—Loose lump, £8 7s. 6d. per ton d/d; GLASGOW: Ground, £10 7s. 6d. per ton; lump, £9 17s. 6d.
ALUMINIUM SULPHATE.—£7 5s. 0d. per ton d/d Lancs. GLASGOW: £7 to £8 ex store.
AMMONIA, ANHYDROUS.—Spot, 1s. to 1s. 1d. per lb. d/d in cylinders. SCOTLAND: 10½d. to 1s. 0½d., containers extra and returnable.
AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.
AMMONIUM CARBONATE.—£20 per ton d/d in 5 cwt. casks.
AMMONIUM CHLORIDE.—Grey, £17 10s. per ton, d/d U.K. Fine white, 98%, £16 per ton, d/d U.K.
AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Sal ammoniac.)
AMMONIUM DICHROMATE.—8½d. per lb. d/d U.K.
ANTIMONY OXIDE.—£68 per ton.
ARSENIC.—Continental material £11 per ton c.i.f., U.K. ports; Cornish White, £12 5s. to £12 10s. per ton f.o.r., mines, according to quantity. MANCHESTER: White powdered Cornish, £15 10s. per ton, ex store.
BARIUM CHLORIDE.—£11 10s. to £12 10s. per ton in casks ex store. GLASGOW: £12 per ton.
BLEACHING POWDER.—Spot, 35/37%, £9 5s. per ton in casks, special terms for contract. SCOTLAND: £9 5s. per ton net ex store.
BORAX COMMERCIAL.—Granulated, £16 per ton; crystal, £17; powdered, £17 10s.; extra finely powdered, £18 10s., packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. GLASGOW: Granulated, £16, crystal, £17; powdered, £17 10s. per ton in 1-cwt. bags, carriage paid.
BORIC ACID.—Commercial granulated, £28 10s. per ton; crystal, £29 10s.; powdered, £30 10s.; extra finely powdered, £32 10s. in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. GLASGOW: Crystals, £29 10s.; powdered, £30 10s. 1-cwt. bags in 1-ton lots.
CALCIUM BISULPHITE.—£6 10s. per ton f.o.r. London.
CHARCOAL, LUMP.—£6 to £6 10s. per ton, ex wharf. Granulated, £7 to £9 per ton according to grade and locality.
CHLORINE, LIQUID.—£18 15s. per ton, seller's tank wagons, carriage paid to buyer's sidings; £19 5s. per ton, d/d in 16/17 cwt. drums (3-drum lots); £19 10s. per ton d/d in 10-cwt. drums (4-drum lots); 4½d. per lb. d/d station in single 70-lb. cylinders.
CHROMETAN.—Crystals, 2½d. per lb.; liquor, £13 per ton d/d station in drums. GLASGOW: Crystals, 2½d. per lb.
CHROMIC ACID.—9d. per lb., less 2½%; d/d U.K.
CHROMIC OXIDE.—11½d. per lb.; d/d U.K.
CITRIC ACID.—1s. 0½d. per lb. MANCHESTER: 1s. 0½d. SCOTLAND: B.P. crystals, 1s. 0½d. per lb.; less 5%, ex store.
COPPER SULPHATE.—£18 5s. per ton, less 2% in casks, MANCHESTER: £18 15s. per ton f.o.b. SCOTLAND: £19 10s. per ton, less 5%, Liverpool in casks.
CREAM OF TARTAR.—100%, 92s. per cwt., less 2½%. GLASGOW: 99%, £4 12s. per cwt. in 5-cwt. casks.
FORMALDEHYDE.—£20-£22 per ton.
FORMIC ACID.—85%, in carboys, ton lots, £42 to £47 per ton.
GLYCERINE.—Chemically pure, double distilled, 1.260 s.g., in tins, £3 10s. to £4 10s. per cwt. according to quantity; in drums, £3 2s. 6d. to £3 16s. 0d. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

HYDROCHLORIC ACID.—Spot, 5s. 6d. to 8s. carboy d/d according to purity, strength and locality.
IODINE.—Resublimed B.P., 6s. 9d. per lb. in 7 lb. lots.
LACTIC ACID.—(Not less than ton lots). Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £50; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £55; edible, 50%, by vol., £41. One-ton lots ex works, barrels free.
LEAD ACETATE.—LONDON: White, £31 10s. ton lots; brown, £35.
GLASGOW: White crystals, £29 10s.; brown, £1 per ton less.
MANCHESTER: White, £31; brown, £30.
LEAD, NITRATE.—£32 per ton for 1-ton lots.
LEAD, RED.—£30 15s. 0d. 10 cwt. to 1 ton, less 2½% carriage paid. SCOTLAND: £30 per ton, less 2½% carriage paid for 2-ton lots.
LITHARGE.—SCOTLAND: Ground, £30 per ton, less 2½%, carriage paid for 2-ton lots.
MAGNESITE.—Calcined, in bags, ex works, about £8 per ton. SCOTLAND: Ground calcined, £9 per ton, ex store.
MAGNESIUM CHLORIDE.—Solid (ex wharf) £5 10s. per ton. SCOTLAND: £7 5s. per ton.
MAGNESIUM SULPHATE.—Commercial, £5 10s. per ton, ex wharf.
MERCURY PRODUCTS.—Ammoniated B.P. (white precip.), lump, 6s. 8d. per lb.; powder B.P., 6s. 10d.; bichloride B.P. (corros. sub.), 5s. 11d.; powder B.P. 5s. 7d.; chloride B.P. (calomel), 6s. 8d.; red oxide cryst. (red precip.), 7s. 9d.; levig., 7s.; yellow oxide B.P. 7s. 1d.; persulphate white B.P.C., 6s. 10d.; sulphide black (hyd. sulph. cum. sulph. 50%), 6s. 9d. For quantities under 112 lb., 1d. extra; under 28 lb., 5d. extra.
METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.
NITRIC ACID.—Spot, £25 to £30 per ton according to strength, quantity and destination.
OXALIC ACID.—£48 15s. to £57 10s. per ton, according to packages and position. GLASGOW: £2 9s. per cwt. in casks. MANCHESTER: £49 to £55 per ton ex store.
PARAFFIN WAX.—SCOTLAND: 3½d. per lb.
POTASH, CAUSTIC.—Solid, £33 5s. to £38 per ton according to quantity, ex store; broken, £40 per ton. MANCHESTER: £38.
POTASSIUM CHLORATE.—£36 7s. 6d. per ton. GLASGOW: 4½d. per lb. MANCHESTER: £37 per ton.
POTASSIUM DICHROMATE.—5½d. per lb. carriage paid. SCOTLAND: 5½d. per lb., net, carriage paid.
POTASSIUM IODIDE.—B.P. 6s. 3d. per lb. in 7 lb. lots.
POTASSIUM NITRATE.—Small granular crystals, £24 to £27 per ton ex store, according to quantity. GLASGOW: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.
POTASSIUM PERMANGANATE.—LONDON: 9½d. to 10½d. per lb. SCOTLAND: B.P. Crystals, 10½d. MANCHESTER: B.P. 9½d. to 11½d.
POTASSIUM PRUSSIAN.—5½d. to 6d. per lb. SCOTLAND: 6½d. net, in casks, ex store. MANCHESTER: Yellow, 6d. to 6½d.
PRUSSIAN OF POTASH CRYSTALS.—In casks, 6½d. per lb. net, ex store.
SALAMMONIAC.—Firsts lump, spot, £42 17s. 6d. per ton, d/d address in barrels. Dog-tooth crystals, £35 per ton; fine white crystals, £18 per ton, in casks, ex store. GLASGOW: Large crystals, in casks, £37 10s.
SALT CAKE.—Unground, spot, £3 8s. 6d. per ton.
SODA ASH.—Light 98/100%, £5 17s. 6d. per ton f.o.r. in bags,

SODA, CAUSTIC.—Solid, 76/77° spot, £13 10s. per ton d/d station. **SCOTLAND:** Powdered 98/99%, £18 10s. in drums, £19 5s. in casks, Solid 76/77° £15 12s. 6d. in drums; 70/73%, £15 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts, 10s. per ton less.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—£19-£20 per ton carriage paid North. **GLASGOW:** £18 10s. per ton net ex store.

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags in 1-ton lots. **GLASGOW:** £13 5s. per ton in 1 cwt. kegs, £11 5s. per ton in 2-cwt. bags. **MANCHESTER:** £10 15s.

SODIUM BISULPHITE POWDER.—60/62%, £12 10s. to £14 per ton d/d in 2-ton lots for home trade.

SODIUM CARBONATE MONOHYDRATE.—£20 per ton d/d in minimum ton lots in 2 cwt. free bags.

SODIUM CHLORATE.—£27 10s. to £32 per ton. **GLASGOW:** £1 11s. per cwt., minimum 3 cwt. lots.

SODIUM DICHROMATE.—Crystals cake and powder 4½d. per lb. net d/d U.K. with rebates for contracts.

SODIUM CHROMATE.—4½d. per lb. d/d U.K. 4d. per lb. **GLASGOW:** 4½d. net, carriage paid.

SODIUM HYPOSULPHITE.—Pea crystals, £15 5s. per ton for 2-ton lots; commercial, £11 5s. per ton. **MANCHESTER:** Commercial, £11; photographic, £15 10s.

SODIUM METASILICATE.—£14 5s. per ton, d/d U.K. in cwt. bags.

SODIUM NITRATE.—Refined, £8 per ton for 6-ton lots d/d. **GLASGOW:** £1 12s. 0d. per cwt. in 1-cwt. kegs, net, ex store.

SODIUM NITRITE.—£18 5s. per ton for ton lots.

SODIUM PERBORATE.—10%, £4 per cwt. d/d in 1-cwt. drums.

SODIUM PHOSPHATE.—Di-sodium, £12 per ton delivered per ton lots. Tri-sodium, £16 10s. per ton delivered per ton lots.

SODIUM PRUSSIAN.—4d. per lb. for ton lots. **GLASGOW:** 4d. **MANCHESTER:** 4½d. to 5d.

SODIUM SILICATE.—£8 2s. 6d. per ton.

SODIUM SULPHATE (GLAUBER SALTS).—£3 per ton d/d.

SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 to £3 10s. per ton d/d station in bulk. **SCOTLAND:** Ground quality, £3 5s. per ton d/d. **MANCHESTER:** £3 10s.

SODIUM SULPHIDE.—Solid 60/62%, Spot, £11 15s. per ton d/d in drums; crystals, 30/32%, £9 per ton d/d in casks. **MANCHESTER:** Concentrated solid, 60/62%, £11; commercial, £8 10s.

SODIUM SULPHITE.—Pea crystals, spot, £14 10s. per ton d/d station in kegs.

SULPHUR PRECIP.—R.P., £55 to £60 per ton according to quantity. Commercial, £50 to £55.

SULPHURIC ACID.—168° Tw., £4 11s. to £5 1s. per ton; 140° Tw., arsenic-free, £3 to £3 10s.; 140° Tw., arsenious, £2 10s.

TARTARIC ACID.—1s. 1½d. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. **MANCHESTER:** 1s. 1½d. per lb. **GLASGOW:** 1s. 1½d. per lb., 5%, ex store.

ZINC SULPHATE.—Tech., £11 10s. f.o.r., in 2 cwt. bags.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 7d. to 1s. 2d. per lb., according to quality. Crimson, 1s. 6d. to 1s. 7½d. per lb.

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARYTES.—£6 to £6 10s. per ton, according to quality.

CADMIUM SULPHIDE.—3s. 0d. to 3s. 3d. per lb.

CARBON BLACK.—3½d. to 4 1/16d. per lb., ex store.

CARBON DISULPHIDE.—£31 to £33 per ton, according to quantity, drums extra.

CARBON TETRACHLORIDE.—£41 to £46 per ton, according to quantity, drums extra.

CHROMIUM OXIDE.—Green, 10½d. to 11½d. per lb.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

INDIA-RUBBER SUBSTITUTES.—White, 4½d. to 5d. per lb.; dark 3½d. to 4½d. per lb.

LAMP BLACK.—£24 to £26 per ton del., according to quantity. Vegetable black, £35 per ton upwards.

LEAD HYPOSULPHITE.—9d. per lb.

LITHOPONE.—Spot, 30%, £16 10s. per ton, 2-ton lots d/d in bags.

SULPHUR.—£9 to £9 5s. per ton. **SULPHUR PRECIP. B.P.,** £55 to £60 per ton. **SULPHUR PRECIP. COMM.,** £50 to £55 per ton.

SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quantity.

VERMILION.—Pale, or deep, 5s. per lb., 1-cwt. lots.

ZINC SULPHIDE.—£38 to £60 per ton in casks ex store, smaller quantities up to 1s. per lb.

Nitrogen Fertilisers

AMMONIUM SULPHATE.—The following prices have been announced for neutral quality basis 20.6% nitrogen, in 6-ton lots delivered farmer's nearest station up to June 30, 1939; November, £7 8s.; December, £7 9s. 6d.; January, 1939, £7 11s.; February, £7 12s. 6d.; March/June, £7 14s.

CALCIUM CYANAMIDE.—The following prices are for delivery in 5-ton lots, carriage paid to any railway station in Great Britain up to June 30, 1939; November, £7 12s. 6d.; December, £7 13s. 9d.; January, 1939, £7 15s.; February, £7 16s. 3d.; March, £7 17s. 6d.; April/June, £7 18s. 9d.

NITRO CHALK.—£7 10s. 6d. per ton up to June 30, 1939.

SODIUM NITRATE.—£8 per ton for delivery up to June 30, 1939.

CONCENTRATED COMPLETE FERTILISERS.—£11 4s. to £11 13s. per ton in 6-ton lots to farmer's nearest station.

AMMONIUM PHOSPHATE FERTILISERS.—£10 19s. 6d. to £14 16s. 6d. per ton in 6-ton lots to farmer's nearest station.

Coal Tar Products

BENZOL.—At works, crude, 9½d. to 10d. per gal.; standard motor, 1s. 3½d. to 1s. 4d.; 90%, 1s. 4½d. to 1s. 5d., pure 1s. 8½d. to 1s. 9d. **GLASGOW:** Crude, 10d. to 10½d. per gal.; motor, 1s. 4d. to 1s. 4½d. **MANCHESTER:** Pure, 1s. 8d. to 1s. 8½d. per gal.; crude 11d. per gal.

CARBOLIC ACID.—Crystals, 6½d. to 7½d. per lb., small quantities would be dearer; Crude, 60's, 1s. 6d. to 1s. 9d.; dehydrated, 2s. 6d. per gal., according to specification; Pale, 99/100%, per lb. f.o.b. in drums; crude, 2s. 1d. per gal.

CREOSOTE.—Home trade, 3½d. to 4d. per gal., f.o.r., makers' works; exports 6d. to 6½d. per gal., according to grade. **MANCHESTER:** 3d. to 3½d. **GLASGOW:** B.S.I. Specification, 6d. to 6½d. per gal.; washed oil, 5d. to 5½d.; lower sp. gr. oils, 5½d. to 6½d.

CRESYLIC ACID.—97/99%, 1s. 3d. to 1s. 6d.; 99/100%, 1s. 9d. to 2s. 6d. per gal., according to specifications; Pale, 99/100%, 1s. 5d. to 1s. 7d.; Dark, 95%, 1s. 2d. to 1s. 3d. per gal. **GLASGOW:** Pale, 99/100%, 5s. to 5s. 6d. per gal.; pale, 97/99%, 4s. 6d. to 4s. 10d., dark, 97/99%, 4s. 3d. to 4s. 6d.; high boiling acids, 2s. to 2s. 6d. American specification, 3s. 9d. to 4s. **MANCHESTER:** Pale, 99/100%, 1s. 9d.

NAPHTHA.—Solvent, 90/160, 1s. 6d. to 1s. 7d. per gal.; solvent, 95/160%, 1s. 7d. to 1s. 8d., naked at works; heavy 90/190%, 1s. 1½d. to 1s. 3d. per gal., naked at works, according to quantity. **MANCHESTER:** 90/160%, 1s. 5d. to 1s. 7d. per gal. **GLASGOW:** Crude, 6½d. to 7½d. per gal.; 90%, 160, 1s. 5d. to 1s. 6d., 90%, 190, 1s. 1d. to 1s. 3d.

NAPHTHALENE.—Crude, whizzed or hot pressed, £4 10s. to £5 10s. per ton; purified crystals, £9 10s. per ton in 2-cwt. bags. **LONDON:** Fire lighter quality, £3 to £4 10s. per ton. **GLASGOW:** Fire lighter, crude, £6 to £7 per ton (bags free). **MANCHESTER:** Refined, £10 10s. to £11 10s. per ton f.o.b.

PITCH.—Medium, soft, 27s. 6d. per ton, f.o.b. **MANCHESTER:** 26s. f.o.b., East Coast. **GLASGOW:** f.o.b. **GLASGOW:** 35s. to 37s. per ton; in bulk for home trade, 35s.

PYRIDINE.—90/140%, 12s. 6d. to 14s. per gal.; 90/160%, 10s. 6d. to 11s. 6d. per gal.; 90/180%, 3s. to 4s. per gal. f.o.b. **GLASGOW:** 90% 140, 10s. to 12s. per gal.; 90% 160, 9s. to 10s.; 90% 180, 2s. 6d. to 3s. **MANCHESTER:** 10s. 6d. to 14s. per gallon.

TOLUOL.—90%, 2s. to 2s. 1d. per gal.; pure 2s. 4d. **GLASGOW:** 90% 120, 1s. 10d. to 2s. 1d. per gal. **MANCHESTER:** Pure, 2s. 4d. per gallon, naked.

XYLOL.—Commercial, 2s. 3d. per gal.; pure, 2s. 5d. **GLASGOW:** Commercial, 2s. to 2s. 1d. per gal. **MANCHESTER:** 2s. 4d. per gallon.

Wood Distillation Products

CALCIUM ACETATE.—Brown, £6 15s. to £9 5s. per ton; grey, £8 to £8 5s. **MANCHESTER:** Brown, £8; grey, £9 10s.

METHYL ACETONE.—40.50%, £32 to £35 per ton.

WOOD CREOSOTE.—Unrefined, 6d. to 8d. per gal., according to boiling range.

WOOD NAPHTHA, MISCIBLE.—2s. 8d. to 3s. per gal.; solvent, 3s. to 3s. 5d. per gal.

WOOD TAR.—£3 to £8 per ton, according to quality.

Intermediates and Dyes

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.

ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.

BENZIDINE, HCL.—2s. 7½d. per lb., 100% as base, in casks.

BENZOIC ACID, 1914 B.P. (ex toluol).—1s. 11½d. per lb. d/d buyer's works.

m-CRESOL 98/100%.—1s. 8d. to 1s. 9d. per lb. in ton lots.

o-CRESOL 30/21° C.—6½d. to 7½d. per lb. in 1-ton lots.

m-CRESOL, 34.5° C.—1s. 7d. to 1s. 8d. per lb. in ton lots.

DICHLORANILINE.—2s. 1½d. to 2s. 5½d. per lb.

DIMETHYLANILINE.—Spot, 1s. 7½d. per lb., package extra.

DINITROBENZENE.—7½d. per lb.

DINITROCHLOROBENZENE, SOLID.—£79 5s. per ton.

DINITROTOLUENE.—48/50° C., 8½d. per lb.; 66/68° C., 11d.

DIPHENYLAMINE.—Spot, 2s. 2d. per lb., d/d buyer's works.

GAMMA ACID, Spot, 4s. 4½d. per lb. 100% d/d buyer's works.

H ACID.—Spot, 2s. 7d. per lb.; 100% d/d buyer's works.

NAPHTHIONIC ACID.—1s. 10d. per lb.

β-NAPHTHOL.—£97 per ton; flake, £94 8s. per ton.

α-NAPHTHYLAMINE.—Lumps, 1s. 1d. per lb.

β-NAPHTHYLAMINE.—Spot, 3s. per lb.; d/d buyer's works.

NEVILLE AND WINTER'S ACID.—Spot, 3s. 3½d. per lb. 100%.

o-NITRANILINE.—4s. 3½d. per lb.

m-NITRANILINE.—Spot, 2s. 10d. per lb. d/d buyer's works.

p-NITRANILINE.—Spot, 1s. 10d. to 1s. 11d. per lb. d/d buyer's works.

NITROBENZENE.—Spot, 4½d. to 5d. per lb., in 90-gal. drums, drums extra. 1-ton lots d/d buyer's works.

NITRONAPHTHALENE.—9½d. per lb.; P.G., 1s. 0½d. per lb.

SODIUM NAPHTHIONATE.—Spot, 1s. 11d. per lb.; 100% d/d buyer's works.

SULPHANILIC ACID.—Spot, 8½d. per lb. 100%, d/d buyer's works.

o-TOLUIDINE.—10½d. per lb., in 8/10 cwt. drums, drums extra.

p-TOLUIDINE.—1s. 10½d. per lb., in casks.

m-XYLIDINE ACETATE.—4s. 3d. per lb., 100%.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

CHAMPION DRUCE AND CO., LTD., London, N., paint manufacturers. (M., 13/5/39.) April 20, deed of release and charge securing the half-yearly payments of interest of 6 per cent. p.a., payable by the company upon a series of 1st debentures for £150,000 secured by Trust Deed dated July 17, 1930; charged on sum deposited with insurance company, etc. *£150,000. May 19, 1938.

CROSSE AND BLACKWELL (MANUFACTURING CO.), LTD., London, W., preserve and provision manufacturers. (M., 13/5/39.) April 25, substituted security supplemental to Trust Deed dated January 15, 1930; charged on rights arising under lease of properties, on the Smith-Embankment, Peterhead, etc. *£1,412,543. May 5, 1938.

FORSIL CO., LTD., Worcester Park, soap manufacturers, etc. (M., 13/5/39.) April 25, mortgage to Burnley Building Society, securing £650 and any other moneys, etc.; charged on 36 Woodnook Road, Streatham. *£1,175. December 21, 1938.

Company Winding-up Voluntarily

ZINC DEVELOPMENT ASSOCIATION, LTD. April 28 (members). (C.W.U.V., 13/5/39.) H. Read, 5 London Wall Buildings, E.C., liquidator, who is authorised to transfer the assets to an association to be registered under the name of Zinc Development Association.

Forthcoming Events

London.

May 15 & 22.—Royal Society of Arts, John Street, Adelphi, W.C.2. 8 p.m. Professor E. C. Dodds, "Modern Chemistry, Modern Medicine and Modern Food."

May 16.—University College, Gower Street, W.C.1. 5.30 p.m. Sir Philip J. Hartog, "The Newer Views of the Work of Priestley and Lavoisier."

May 17.—Electrodepositors' Technical Society. Northampton Polytechnic Institute, John Street, E.C.1. 8 p.m. Conference on "Protective Metallic Coatings."
Royal Society of Arts and Royal Photographic Society. Royal Society of Arts, John Street, Adelphi, W.C.2. 8.15 p.m. The Centenary of Photography.

May 18.—Chemical Society. Institution of Mechanical Engineers, Storey's Gate, S.W.1. 6 p.m. 7th Liversidge Lecture by Professor C. N. Hinshelwood, "Some Considerations on the Nature of Catalysis."

May 19.—Royal Institution, 21 Albemarle Street, W.1. 9 p.m. J. D. Cockcroft, "New Phenomena in Liquid Helium."

New Companies Registered

Hygienic Chemical Company, Ltd. 352,310.—Private company. Capital £2,500 in 2,500 shares of £1 each. To carry on the business of manufacturers of and dealers in insecticides, chemicals, gases, drugs, medicines, etc. Subscribers: W. J. L. Williams, 2a Whitehall Court, S.W.1; N. J. Brabyn. Registered office: 10 Sedley Place, W.1.

British Thermcol, Ltd. 352,595.—Private company. Capital £100 in 100 shares of £1 each. To carry on business as manufacturers of and dealers in oil, coal and coke and patent fuel of all descriptions; carbonisers and distillers of coal, shale and other substances; manufacturers of gas motor spirit, naphtha, oils, dyes, etc. Subscribers: Edward H. Williams, 203 Cathedral Road, Cardiff; Jas. G. O. Thurston.

Cyclo Solvents and Chemicals, Ltd. 352,646.—Private company. Capital £3,000 in 3,000 shares of £1 each. To carry on the business of manufacturers of and dealers in chemicals of all kinds and chemists' sundries, manufacturers of essential, mineral, fatty and vegetable oils, fats, waxes, drugs, gums, spirits, etc. Subscribers: May A. Abbott, 105 Cheapside, E.C.; Olive E. McMurdie.

Hydro-Nitro, Ltd. 361,922.—Private company. Capital £100 in 100 shares of £1 each. To carry on the business of constructional engineers and contractors, chemical engineers and consultants, designers of plant and machinery for use in the manufacture of chemicals and by-products of all kinds, including those required by the nitrogen industry, and which may be capable of being used in the manufacture of synthetic ammonia, and derivatives, compounds and by-products, etc. Subscribers: Claude H. Polly, 69 Vicarage Road, Chelmsford; Kenneth L. Titmuss.

Norill and Co., Ltd. 350,661.—Private company. Capital £6,000 in 6,000 shares of £1 each. To acquire and exploit the rights to a cleaning fluid known as "Norill" and to carry on the business of manufacturers and sellers of and dealers in chemical products of all kinds, and to enter into agreements with (1) Scrubb and Co., Ltd., and R. W. Greeff and Co., Ltd., (2) Chemical and Natural Products, Ltd., and (3) Norman Hill Bros., Ltd., Geo. Hamilton-Browne and Chemical and Natural Products, Ltd. Directors: Ernest Ronald Naphthine, "Brecon," Sandy Lane, Cheam, Surrey; Percy Kynaston Metcalfe. Registered office: Wimbledon Factory Estate, Morden Road, Wimbledon, S.W.19.

The Zinc Development Association. 352,642.—Company limited by guarantee without share capital. The word "Limited" is omitted from the title by licence of the Board of Trade. To acquire the assets, liabilities and business of the Zinc Development Association Limited, and to promote the increase in the consumption of zinc, etc. Subscribers: Imperial Smelting Association, Ltd. (by Henry V. Casson); London Zinc Mills, Ltd. (by Sidney C. Hunt); National Smelting Company, Ltd. (by Stanley Robson); Electrolytic Zinc Company of Australia, Ltd. (by Clive L. Baillien); Burma Corporation, Ltd. (by Arthur T. W. Raine); Trepeca Mines, Ltd. (by William F. Winn); Amalgamated Metal Corporation, Ltd. (by William Mure).

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Iraq.—A firm in Bagdad wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of lubricating oil. (Ref. No. 395.)

Egypt.—H.M. Consul-General at Alexandria reports that the Municipality of Alexandria is calling for tenders for the supply and delivery of pharmaceutical products, serum, hospital accessories, etc. Tenders, endorsed "Offre pour la Fourniture des Produits Pharmaceutiques, Divers Accessoires, Produits Chimiques, Specialites, Instruments de Chirurgie, Vaccins, Serum et Articles de Laboratoire," should be addressed to S.E. le Directeur-General de la Municipalite, Alexandria, Egypt, by whom they will be received up to noon on June 14, 1939. Samples in respect of certain of the items called for are required to be submitted. (Ref. T. 22099/39.)

France.—A well-established firm of agents at Paris wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of alkaloids, glucosides, biological products and resinoids for France. (Ref. No. 387.)

France.—A well-established agent in Paris wishes to obtain the representation of United Kingdom manufacturers of special oils, varnishes, cements, paints, for the motor-car, aeronautical, steel and iron industries, etc., for France. (Ref. No. 389.)

Poland.—An agent in Warsaw wishes to obtain the representation of United Kingdom producers of hydrogenated or hardened oils. (Ref. No. 392.)

British India.—A well-established firm of agents at Karachi wishes to obtain the representation, on a commission, consignment or purchasing basis, of United Kingdom manufacturers of patent medicines for Sind, Punjab, Baluchistan and North-West Frontier Province, inclusive of Delhi. (Ref. No. 376.)

British India.—H.M. Trade Commissioner at Calcutta reports that the Indian Stores Department is calling for tenders (Tender No. M 4430, Rate Contract) for the supply and delivery of quantities of nitric, sulphuric and hydrochloric acids required during the period October 1, 1939, to September 30, 1940. Tenders should be addressed to the Indian Stores Department, Miscellaneous Branch, Simla, by whom they will be received up to June 6, 1939. A sealed sample in a glass stoppered bottle of each of the acids offered, which must contain not less than one pint of acid, must be submitted to the Superintendent, Government Test House, Alipore, Calcutta, by May 25, 1939. (Ref. T. 22106/39.)

Argentina.—The Commercial Secretary to H.M. Embassy reports that the Argentine State Oilfields Directorate is inviting the submission of samples in connection with a general test of paints, varnishes, oils, etc., that is to be undertaken this year. Interested firms may obtain further particulars regarding this matter on application to the Department of Overseas Trade, 35, Old Queen Street, S.W.1. (Ref. T.Y. 21834/39.)

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